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THE BRISTOL MEDICO-CHIRURGICAL JOURNAL

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THE BRISTOL MEDICO-CHIRURGICAL SOCIETY.

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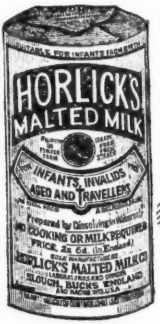

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Scire alius sciret."

DECEMBER, 1915.

THE FOUNDATION OF THE BRISTOL MEDICO-CHIRURGICAL SOCIETY, AND THE HISTORY OF MILITARY MEDICINE IN ENGLAND.

The Presidential Address, delivered on October 13th, 1915, at the opening of the Forty-second Session of the Bristol Medico-Chirurgical Society.

BY

G PARKER, M.A., M.D. Cantab.,

Major, R.A.M.C. (T.F.), 2nd Southern General Hospital; Physician to the Bristol General Hospital.

FIRST of all I heartily thank the Society for the great honour it has conferred on me by electing me to this chair, an honour which I prize the more as it comes from old and valued friends whose kindness has shown itself in so many ways in the past. This year I shall have especial need of the support of every member, for never since its foundation has there been a time which called for greater care and anxiety among those responsible for the prosperity of this Society.

There are two subjects to which I should like to direct your attention to-night. One deals with the history of the Society as an embodiment of the medicine of our time. The other is the growth of the Royal Army Medical Corps, now claiming the minds and bodies of most of us, as one result of the development of military medicine in the past.

I would recall to your minds that it is forty years from the first Annual Meeting of the Bristol Medico-Chirurgical Society to the present one. The Society was designed primarily to help on our clinical and pathological work, and the circular letter which led to its foundation was signed by Dr. Shingleton Smith, Mr. Dobson and Dr. Spencer. There were then one hundred and forty medical men in Bristol and Clifton. There are now 275.

There were four hundred and forty-eight beds in the hospitals, and the population was about 196,000. It is now 363,000.

At this first Annual Meeting in February, 1875, it was announced that there were fifty members, an income of £26 5s. 0d., and an expenditure of £14 15s. 6d. The original President, Dr. Brittan, gave place then to Mr. Coë. Dr. Martin was to be Vice-President, and Dr. Shingleton Smith was the indefatigable Secretary, a position which he held till 1888.

After the election of officers a short business meeting took place, when Dr. Spencer discussed a case of cancer en cuirasse of the stomach, encephaloid disease as it was then called, with secondary growths. Dr. Martin was to have demonstrated prickle cells in rodent ulcer, and Mr. Dobson showed two calculi removed from children by the lateral operation. Eleven of the members of that year are alive, and twenty of those who appear in the first volume of *Transactions*, which covered the first four years of the Society's life.

Since the date of that meeting, now forty years ago, what changes have taken place in this Society, in our profession, and in the world. Since then we have established and kept going our *Journal* from 1883, which has reached its 128th number through the steady toil of our editorial staff. Since then too we have founded and collected a great library unparalleled in the West of England, about the future of which we have great hopes, though the present difficulties of it and the *Journal* are an anxious problem.

We can hardly realise in the steady current of our lives that the changes of medicine itself in that period have been gigantic. It may even be said that no other forty years in our history can show such advances. To take only two or three of them. There are, for instance, the development of aseptic surgery, and the elucidation of the diseases due to micro-organisms, *i.e.* the explanation at last of those strange disorders which run a limited career of their own and end of themselves.

The outburst of knowledge in these two subjects has altered the entire field of medicine and surgery more than the discoveries of any like period. No doubt the wonderful development of anatomy in the sixteenth century, the building up of physiology in the seventeenth by the aid of chemical, physical and mathematical science, the growth of pathological histology and the discovery of anæsthetics towards the middle of the nineteenth century equally aroused popular enthusiasm, and were great advances, but in the lifetime of our Society the greater part of our actual practice has been revolutionised by these two conquests.

It is interesting for us to note that in Dr. Brittan's inaugural address he took the line that a certain class of diseases are transmitted by particles. Dr. Fox rightly thought that was the most important position in it. Dr. Budd, of course, had gone on similar lines previously.

Davaine had discovered the anthrax bacillus in 1863. Pasteur had brought out some of his great results in 1864, and Lister commenced his work in 1865.

Our Society, then, began when the new teaching was being accepted, and its records reflect the great unfolding of the results.

There were illuminating addresses by Dr. Fripp on the contagium vivum, and by Dr. Fyffe on the poison of malaria in 1883, seven years before its nature was settled by the Campagna experiments and by the transmission of infected mosquitoes to London, where they reproduced the disease. Dr. Shingleton Smith started us with masterly expositions of the new theory of phthisis, and as soon as Koch demonstrated the bacillus in 1882, he presented the native product to our eyes, while Mr. Munro Smith showed us the presence of tuberculosis in the animal world. An outbreak of scarlet fever and one of infectious throats in Clifton gave opportunities for discussions which trained men in the new ideas. Mr. Greig Smith laid before us some of the new successes of surgery, and commenced a study of joint diseases which he did not live to complete. We find perhaps his earliest paper in the discussion on the treatment of pyrexia by antipyretic drugs or the cold bath. The advantages of the latter method as carried out by Brand and others included an actual saving of seven lives in every hundred in typhoid, a saving, by the way, which no one has shown to follow our more lazy method of sponging.

I must not stop to trace the great triumphs of antisepsis, of vaccines, and the huge technical work of pathological chemistry and bacteriology which have sprung up since 1875, and have led to some great successes and many failures.

A brilliant advance, too, in this forty years has been made in two other fields of disease, that of the nervous system and that of the heart. Both have been revolutionised since 1875.

Hughlings Jackson, Ferrier, Gowers and Ramon y Cajal have made a new map of the nervous system, and no one looking over the records of the Society can fail to be struck with the endless pathological work of Dr. J. Michell Clarke and others which has helped to build up the new structure. In more recent times the physiology and pathology of the heart has begun to be written anew through the labours of Mackenzie and others, in which some of our own members have also shared.

Laryngology, too, with the laryngoscope and great surgical operations on the throat and nose, and gynæcology, with its triumphs of ovariotomy and hysterectomy, are almost entirely changed. We look back with regret to the addresses in which Drs. Swayne and Aust Laurence dealt with the new advances.

Lastly, in public health we note a startling change both in organisation and in the science which earlier pioneers, such as Chadwick, had founded. The control of epidemic diseases, the cleansing of towns, the care of children and the practical abolition of typhus and typhoid are marvellous. I well remember at one of the first meetings I attended how Dr. Fox described the great typhus outbreak of 1865, and how it ceased to be infectious under treatment in huts outside the city.

The National Insurance Act, too, has aimed at supplying medical treatment to millions who were practically without it.

However, the enormous extension of these public services makes us tremble for the very existence of private practice. As Professor Morrison has remarked, how many patients are already provided for now by—

(1) The Navy, Army, Indian and Colonial Services.

(2) The Poor Law, with 238,000 persons out of doors, 108,000 indoors, and 67,000 in the infirmaries, and 125,000 lunatics.

(3) The Prisons, Reformatories, and Feeble-Minded Homes and Epileptic Colonies.

(4) The Tuberculosis Sanatoria and Dispensaries.

(5) The Infectious Diseases Hospitals with 25,000 beds, the Medical Officers of Health and their Inspectors.

(6) The Inspection and Treatment of School Children.

(7) The Inspection of Factories and Mines.

(8) The work of the Voluntary Hospitals.

(9) The fourteen and half millions treated by the Insurance Act.

Such a list makes us wonder whether in another half century there will be any private patients at all.

On the other hand, if we ask in which portion of our art least progress has been made in these forty years, we are struck with the few gains we have made in actual remedies for disease except surgical and preventive measures and a few vaccines and extracts. In the first volume of our *Transactions* is an elaborate paper by Dr. Spencer on the salicylates and salicin, then just coming into use. No drug probably of equal importance has been introduced in these forty years.

We had begun to lose faith in our drugs. It was already the fashion to belittle them. We in Clifton abandoned our hot wells with their strongly radio-active waters on which the prosperity of the place had arisen, and sent our patients for change of air to Buxton or Germany.

We have tried a countless host of new drugs since with scanty success, and I think we have lost much of the skill which our predecessors had in using old ones, such as opium.

Some of those who have lost all faith in them tell us that the very idea of pouring bottles of medicine into the body to effect a change in metabolism is absurd, but we daily see the lowly microbe producing these very changes by the

secretions he pours in. It is a question of skill in the use of fit means for well-defined ends.

Still, the fact remains that we are dreadfully deficient in remedies for kidney disease, for gout, diabetes, rheumatoid arthritis, for the prevention of apoplexies, which destroy great hosts of people in the prime and fall of life, and for remedies against acute rheumatism, the universal malaria of the country, which ruins almost as many young lives as plasmodial malaria did in the past, and does in the tropics to-day. "Lord, have mercy on the poverty of our art," prayed an old physician.

A curious light is thrown on the inadequacy of our remedies by the enormous sale of patent medicines. It is easy to say that they are frauds and flourish on the superstition of the public, but whether they cure or not, they are bought because the buyers have pains which we often fail to relieve. Many of them are simple drugs thoroughly well compounded.

However, we urgently need an Act on the lines of the Select Committee forbidding fraud in their composition and the scandalous promises of cure for incurable diseases such as cancer and advanced phthisis, even if this entailed ruin on our Patriotic Press.

These matters are for the moment overshadowed by the pressing need of providing medical aid during the war for the civil population and for the Army. I shall therefore turn to the Royal Army Medical Corps and the history of military medical service in this country. The Corps has only existed in its present form from 1902, but organisations for the purpose appeared during our earlier wars.

Leaving out the thousand years from the coming of the Romans to William the Conqueror, our military annals in the last eight hundred and fifty years fall into four periods.

First, the period (1066 to 1314) of the consolidation of the

Anglo-Norman Empire includes numerous civil wars and certain crusades in the East.

Secondly, the period of the abortive attempt at expansion gives us the Hundred Years' War with France and the civil war which followed it (1348 to 1485).

Thirdly, the period (1515-1815) of the real expansion of England, the struggle for the New World and the building up of the Colonial Empire includes endless wars all over the world, and civil wars at home and in America.

The fourth period, from 1855 to 1915, shows a group of wars for the defence of the existing Empire, though expansion had not quite ceased.

To go back to the first group. As the armies were territorial, we may perhaps say that the onus of providing medical aid was laid on the local commanders. Little is known of the Norman medical service, except the names of one or two men like Dr. Nigel, who received lands at Clent and Droitwich for his services as an army surgeon with troops on the Welsh border; but there are other men attached to great nobles, such as Gregory, the doctor of the Earl of Warwick about 1120, Reginald of Bath, and Royal physicians and surgeons such as Grimbald, Ranulf of Besace under Richard I., Tyngewich and Weseham. The first instance of a Royal Medical Corps is seen in the group of seven physicians and surgeons whom Edward I. took north in his Scotch war of 1297. There were at first no Universities nearer than Italy where they could be taught, but in great hospitals such as St. Bartholomew's, in the commanderies of the Knights Hospitallers, in apprenticeships, and in many monasteries medical and surgical studies were carried on.

In our second period the new Universities, and especially the College of St. Como at Paris, had begun to train medical men, while in England certain strange legal corporations, the barber surgeons, gradually came to include almost the

whole of the surgeons in the kingdom, and to give them in many instances a sound professional education by lectures, examinations and apprenticeships. It must be remembered that the surgeons in London, at any rate, became distinct from the barbers and others within the guild though united for legal purposes, just as in the great Florentine guild, of which Dante was a member, there were physicians, artists, mercers and thirty other callings. This official body afforded a reserve of surgeons. Thus in 1345 the city of York sent two barber surgeons to Bamborough to treat a political prisoner, David Bruce, and to extract an arrow from his wound, for which these gentlemen received a fee of about £50 each in our money.

For a time indeed the purely military surgeons had an organisation of their own, and as the French wars were carried out by well-paid troops and the ransom of prisoners was high, the health of both troops and prisoners made it worth while to give good fees to their doctors.

The most striking of these great army surgeons was John of Arderne, who, as Mr. D'Arcy Power says, was a scholar and a gentleman, a great traveller, who moved amongst the knights and heroes whose deeds in Flanders still live in the pages of Froissart.

One is charmed with his occasional chat about botany, the places where juniper grows in Kent and in Surrey, "where the people call it gorst because they do not know its proper name;" and his advice to the doctor to dress well and not like a minstrel, for, he says, a prudent man of clerkly dress and bearing, with clean hands and well-shapen nails may sit at any gentleman's table. He warns his young surgeon, too, to be courteous, gentlemanly and moral in word and deed. His works on surgery were popular text-books for ages. Perhaps one of the most striking things he wrote is a chapter on cancer of the rectum, the need of

diagnosis by the skilled finger, the danger of mistaking it for dysentery, of operating upon it in error for something else, and the symptoms of the patient as he gets feebler and weaker, and sinks with a slight terminal fever. Whatever others may say, "I have never," he concludes, "seen or heard of any man who recovered from cancer, but I have known many who died of it."

An oft-quoted document shows how Henry V. agreed with a physician, Dr. Colnet, and a surgeon, Mr. Morstead, to take out a small medical corps to look after the army which fought at Agincourt five hundred years ago this month. Morstead's pay seems to have been about £1 16s. 0d. a day, with mess allowances and a share of booty or prize money. He was to have Mr. William Bredwardyne as lieutenant and twelve surgeons at 18s. a day in our money who were accordingly impressed.

I must not stop to talk of the medical guild which these military surgeons formed after the war—how they agreed not to steal each others patients, and to exclude for ever from practice chronic students who failed in two examinations; or about the wonderful Academy of Medicine and Surgery which they set up in London, and which came to an untimely end in 1423.

The third period commenced under the Tudors. Here we find the pay of military surgeons, about 1500 A.D., discussed by John Harvey, who says: —

"He that will be a surgeon in the wars must choose him as captain some noble liberal man that loves his men well, and must know what he will allow his surgeons a day. If he be a nobleman that is your captain, he will allow you as others do, 2s. [*i.e.* about £1] a day to the chief surgeon, unto the second 1s. 9d., to the third 1s. 4d., etc., and also a groat apiece of every soldier every month.

"His balderic must be of his master's colours about his

neck with a spatula before, and behind with the king's arms in like manner. Besides [he can reckon on] the cases that he will have abroad among noblemen and other soldiers, if he be perfect in his science, well acquainted, gentle[manly], close, honest and merry. Also know what your master will allow you for your coffer [or military chest]. The captain will carry your chest, or else you must have a wagon with a horse or two amongst you, wherein you shall put your tents, your coffer, your bedstead and bed, your clothes, two or three shirts, two or three pairs of hose, your cassock or nightgown, your hood and hose of frieze, your high boots and ford boots, your various shoes and other things necessary for a surgeon."

In explanation of this we may note that the balderic was the officer's sash such as many of us remember, and from which the sword was formerly hung. The contents of the surgeon's chest were supposed to be provided from the 2d. or 4d. from each soldier, until Charles I. made a special grant.

During the Middle Ages, and until 1655, each company had its surgeon, but afterwards down to our own time he was a regimental officer. Thus in the army at St. Quentin, 1557, there was one surgeon to each one hundred men, the pay being 1s. a day in infantry up to 2s. in cavalry. The same pay seems to have been given to surgeons in the 70,000 men arrayed against the Armada and in the Irish campaigns.

The Elizabethan surgeons form a most brilliant group. Many of them had been trained under the rigorous educational system of the London Barber Surgeons Company, were well grounded in the new anatomy of Vesalius, and had served in Flanders and at Havre and elsewhere. Thus Will. Clowes, for instance, has left us a charming case book illustrating such matters as shot wounds, gunpowder burns, gangrene and wounds of the omentum. The old treatment

of wounds by cleanliness and spirit lotions advocated by Mondeville had long given way to the use of endless ointments and lotions, but Clowes was a bold and careful surgeon. He would not accept the popular theory that all shot wounds were necessarily poisonous, though he got experiments made by the artillery commander at Portsmouth to find out whether an intentionally poisoned bullet was disinfected by the heat of the explosion and the passage through the air, and showed that there was no such effect.

In the case of a soldier who had an undiscovered bullet with a deep sinus in the groin for three years after a fight in Flanders, Clowes tried endless methods to detect and reach the bullet by flexible probes and dilators. As a last resource he bethought himself that a liquid would reach it, and injected through a long tube a solution of what seems to have been nitrate of silver and left it in. Next day pain and swelling appeared in the right buttock near the anus. He cut down on this, found and removed the bullet, and healed the sinus.

J. Gale, too, wrote on the old controversy upon the poisonous character of shot wounds, as well as an amusingly ferocious attack on the quacks of the time, the tinkers, pig-gelders, and out of work men whom Acts of Parliament failed to suppress. He says, too, that in one year he helped to recruit seventy-two surgeons in London for the fleet and army, but twenty years later there was a great shortage. Banister, the anatomist, was another prominent army surgeon who served both in Flanders and at Havre.

Peter Lowe, after many years in the continental wars, translated Hippocrates, and wrote a text-book of surgery. When he came home he persuaded the King of Scotland to found the existing Faculty of Physicians and Surgeons for Glasgow and district.

In the time of Charles I. the pay of the regimental

surgeon rose to 2s. 6d. a day (money being worth three or four times its present value) and a free chest of stores to commence with, besides the twopence a month from each soldier.

The Parliament in the Civil War was much better off for money and better supplied with surgeons than the King, though both sides had often to call on local practitioners to help with the wounded.

Besides Physicians-General and Surgeons-General, with the oversight of an army, we find Staff-Surgeons both for the Staff and for hospitals. As to the latter, we are told that St. Bartholomew's, St. Thomas's, the Savoy, Ely House and Heriot's House in Edinburgh were used as Base Hospitals, while in 1652 Parliament sent two hundred and twenty invalids to Bath for treatment.

Before the Civil War old John Woodall, of St. Bartholomew's, after serving on the continent and travelling through Poland and Germany, became Surgeon-General to the new East India Company, and was sent to treat the wounded from the Isle of Ré. He has the honour of introducing lime juice for scurvy, and is the author of a text-book for naval surgeons called the *Surgeon's Mate*.

The incomparable Harvey can hardly be reckoned as an army surgeon, but the best surgical teacher of the time seems to me to be Alexander Read. His description of the circulation of the blood from the heart through the vessels and the lungs is derived apparently from Harvey, while his account of surgical sutures for the peritoneum, and of the use of ligatures, torsion and other means of stopping hemorrhage is remarkable. He describes, too, an experimental excision of the spleen.

The exemption of surgeons from serving on juries which had been granted to the London Barber Surgeons by Edward IV., and confirmed by the Great Statute of 1540,

seems to have been given with a view to their being ready to serve in war. This is actually expressed in the charter of Queen Mary to the Edinburgh company. Accordingly one of the London Company's duties was to impress sufficient army surgeons in war time. Thus in 1626 they had to press surgeons for Rochelle and next year for the Isle of Ré, and sixteen more in 1628. In 1639 we find them pressing twenty-three surgeons for the Scotch war, and sending them by ship to Newcastle. In 1641 the justices impressed others for the Irish Rebellion, and in 1644 the Company again pressed men for the Parliament.

After the Restoration they had to find twenty surgeons and twenty assistants or mates for the war of 1672. We may add that their new charter of 1629, which gave the London Barber Surgeons the right to practise anywhere in England, had made the Company the examiner and licenser of all naval and ship surgeons. At one time they licensed five hundred men a year for the navy alone.

In the great Civil War two names of interest stand out on opposite sides, James Cooke, of Warwick, and Sir Richard Wiseman.

Cooke, the Puritan, had a good general practice, and served in the army of the Parliament. He is the man who went one day to see Shakespeare's daughter, good Mistress Hall, to examine the Latin medical manuscripts of her late husband, Dr. Hall, which he finally translated and published. She happened to say that one paper was not written by him, but confessed she could not read it. Possibly Cooke had some difficulty to make it out. It is upon this slender foundation that Baconians argue that Shakespeare's daughter, " witty beyond her sex," as her epitaph says, could not read or write.

Cooke wrote a most popular text-book of surgery, which went through endless editions, and a supplement on medicine,

one of the rarest books in the world, where he discusses fevers, rickets, just made fashionable by Glisson, and small-pox, and ends with a discussion of what is needed in the surgeon's chest for the preservation of the wounded, and the care required in its use. " For," he adds, " the subject to be dealt withal is not a beast, but man, for whom, in some sense, the Son of God has shed His most precious blood, and if there be neglect it must be answered before the Lord at the dreadful day—for blood guiltiness in neglecting thy duty, or for both that and drunkenness [leading] to the ruin of men bearing perhaps a more fuller representation of God on them than you yourself."

Cooke is at his best in his accounts of cases he treated in the war. He tells us how two cavalry patrols mistook each other for the enemy near Kineton, and one of them got three bullets through his chest so that the air hissed in and out as he breathed. He was carried in a jolting cart to Warwick, some ten miles, but there he recovered without a check, Cooke wisely refraining from much interference.

He is rather proud of a case where he diagnosed a wound of the heart, which he verified *post-mortem*. It was a poor officer's servant who remonstrated with a soldier of the Scottish army when passing, and was stabbed in the side by a dirk for his pains. Cooke, standing at the gate of Warwick Castle, saw the man ride up blanched and breathless, and put him to bed, but felt the case was hopeless, for definite signs of a cardiac wound were present, and die he did in two days or less, but in a pious and edifying manner.

Sir Richard Wiseman, the Royalist, is an instance how a life of strenuous activity in the field may be combined with brilliant achievements in professional knowledge.

He had toiled in the rough school of the Dutch navy, and fought through the campaign of the Western Counties till he went into exile with Prince Charles. Again he served

through the Scotch war of 1652 till the crowning disaster of Worcester. A prisoner in the Tower, and finally a naval surgeon in the Spanish fleet for three years, he came back to honour and wealth after the Restoration, to die at last at Bath, probably from hæmoptysis.

Who does not remember his war stories, such as that of the Irishman whose hand he amputated early one morning, and who beat him in a race two days after when the enemy surprised them both. He was a water drinker amongst wild-living cavaliers, and spent the leisure of his last years in writing a great classical work on surgery, "which is far beyond any previous work in building up general principles from the case under discussion."

After the Restoration the pay of army surgeons in the standing army was fixed at 4s. a day, and remained at that sum for a very long period. To each regiment a surgeon and his mate or assistant were allotted, and a grant was made to each company of £3 per annum for medicines and £3 for dressings. All candidates for the medical service had to get the approval of the Physician or Surgeon-General. The legal position of the army was at last defined by the Annual Mutiny Acts commencing in 1689. Previously it was difficult to enforce discipline in peace under existing statutes; and when five hundred of the Royal Scots deserted in a body and marched homewards the magistrates were helpless. It is under this Act, as renewed from year to year, that the King's Regulations, the soldiers' Bible as it has been named, has legal force.

In William III.'s Irish campaigns a fearful medical breakdown took place, and 6,300 men died from want and sickness, especially from dysentery, the disease of the country as it was called. To this breakdown we owe the first introduction of marching or field hospitals, clearing or fixed ones, and base hospitals such as Kilmainham in Dublin.

Under the care of Marlborough later on we find hospitals well maintained, and female nurses as well as male seem to have been employed.

Under the Hanoverian kings for the rest of this period the pay and the regimental system were both unchanged. The development of hospitals in three grades went on, while another most important step was taken in neutralising and protecting from capture medical officers and nurses with the sick and wounded by international conventions. Such agreements were made in 1743 and in the Seven Years' War. In the Napoleonic struggle the plan fell through, but at last by the Convention of Geneva, 1864, neutralisation became part of the public law of Europe.

I cannot now sketch the work of the great army physicians and surgeons of the later wars. Pringle, Grainger, Dimsdale and the officers of Wellington would require a lecture for themselves.

During the long peace after 1815 our medical system, defective as it was originally, fell into greater and greater disorder, in spite of the protests of the officers and of the Duke of Wellington himself. Even in peace the health of the soldier was neglected. He was enlisted for life, flogged mercilessly, and housed in such insanitary barracks that the death rate of the Foot Guards was twenty per thousand, while that of poor agricultural labourers of the same age was only eight. phthisis being the chief cause. The men slept on shelves, two together, round the barrack room. The beds were of straw down to a recent period, with a sheet of sacking washed once a month. The over-crowding would be inconceivable now. The soldiers' food and clothing were pilfered, not being protected by Government contracts. His body was unwashed and stinking. Only two meals a day were given him, but he had to drink a compulsory eight ounces of spirits.

The opinion of the medical officers went for nothing, for

until the Royal Warrant of 1858, after the disclosures of the Crimea, they had no power even to make recommendations for the protection of the men's health. They might die, for instance, in bad barracks, such as the Up Park one in Jamaica, at the rate of one hundred and forty per thousand, while in the Maroon Town barracks close by the rate was only thirty-two, no medical opinion being asked or listened to. An old notice board from a door which has been preserved speaks volumes :

—TH REGIMENT.
COOKHOUSE, LAVATORY, & PRIVY.

At last then this Warrant gave them not only the care of the sick and the administration of the hospitals, but also imposed on them the duty of recommending to the general and other commanding officers measures which may conduce to the health of the troops and to the prevention of disease.

This was a great step, but the doctors were isolated and feeble individuals in each regiment. Each of them had a tiny hospital and three soldiers as orderlies. Even here the medical officer had no power of command, and the sergeant maintained discipline.

The system was hopeless in war. There were forty-seven such dolls' hospitals in an army corps, but no ambulance, or organisation for carrying off the wounded. One battalion might have hundreds of wounded with only one surgeon and no trained dressers, nurses or transport ; others might have their surgeons standing idle.

The system failed, as Evatt says, on the Alma hillside in September, and came to utter grief in the corridors of the great Scutari hospital in the winter. Our whole organisation is based on the bitter lessons learned then. In a word we needed the means of removing the sick and wounded in comfort instead of carrying them on with the fighting line, which is impossible in a rapidly-moving modern army.

When general hospitals were formed eight or nine different departments governed them, but no single head compelled co-operation, as Miss Nightingale remarked.

There was no uniform entrance examination for surgeons, no practical tests of efficiency or of knowledge of preventive medicines for the very men who had to safeguard our troops in every part of the world.

Two popular movements gave a great impetus to the improvement of the service. One was the rapid development of the art of nursing which followed Miss Nightingale's splendid work in the Crimea. This led in time to the introduction of nursing sisters and the thorough training of nursing orderlies. Again, the rise of Voluntary Aid Societies for helping the wounded after the Geneva Convention, and still more in the Franco-German War of 1870, produced a huge reserve of trained bearers and transport.

After all the efforts of Sidney Herbert and other reformers it was not till 1873 that the old regimental system was broken up, and the medical officers were formed into one body, the Army Medical Department, and the nursing orderlies were made into the Army Hospital Corps. Four years later the actual command of this corps and of the general hospitals was given to medical men.

The Ambulance first appeared as stretcher bearers in 1873, and bearer companies in the Transvaal War of 1879–80. Field hospitals were formed in Egypt in 1882. Other changes had to wait, and in 1886 the Army Medical Department was cut down for economy. Further improvement of the medical service seemed as far off as ever. The officers were isolated from the activity of civil professional life on the one hand and from the *esprit de corps* of the combatant ranks on the other. In spite of the brilliant work of such leaders as Ronald Ross, Leishman and Bruce, the service attracted fewer and fewer men.

In 1897 fresh reforms were promised, and Lord Lansdowne obtained from Queen Victoria a Warrant constituting the Royal Army Medical Corps, but it had few attractions, and candidates were fewer than the vacancies.

At the outbreak of the Boer War there were only five hundred and forty medical officers to supply the needs of the depots and of an army of 250,000 men, one-third or a quarter of the proper number. The terrible breakdown which resulted in Africa, and the losses due to the soldiers' ignorance of sanitation, as well as to the deficiency of medical officers, led again to a great public inquiry, and finally Mr. Brodrick's Re-organisation Committee and Civilian Advisory Board carried out complete and searching reforms.

The Royal Warrant of 1902 and the following Orders end our story happily, for they not only granted improved pay, but they gave substantive rank, they authorised an increase in the numbers, which made it possible to grant leave for study and research. Under them the grand new Royal Army Medical College for study was built at a cost of £100,000 in London instead of at Netley, so that the best opportunities for scientific work might be available. Under them higher posts are given as rewards for special proficiency or by practical examination, and not by seniority. Under them the study of sanitation was placed in the highest rank, and elementary teaching in it is given not only to the privates of the corps, but also to combatant officers of the line.

The deficiency of candidates ceased; even in that year the medical officers rose to 965, and plans were drawn up for great Territorial reserves, through which some of our present armies have been staffed, while the National Red Cross Society and the Association formed by the Order of St. John were entrusted with the preparation of a host of additional bearers, nurses and hospitals.

In conclusion, the success of the present organisation, preserving the lives and health of our soldiers in the last twelve months, is acknowledged on all sides, and we may look forward to even greater triumphs in the future.

NOTE.—I gratefully acknowledge the help I have received from the papers of Howell, Evatt and other writers in the Journal of the R.A.M.C.

CARDIAC DISEASES AND DISORDERS IN WARFARE.

BY

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THE stress of work at the Southmead section of the 2nd Southern General Hospital has prevented any systematic investigation into the cardiac disturbances and lesions that have been encountered. Nevertheless, it may be worth while to report the most definite impressions that these matters have made on my mind.

First, there have been a fair number of cases of frank organic disease of the heart. I recollect but one example of the renal heart, in a man of about 40. His kidney lesion was obscure, and probably of long standing. His symptoms were cardiac, and it was on this score that he was invalided out. My own cases have only included one or two possible instances of cardiac syphilis, in the form of aortic valvular disease with some diffuse dilatation of the aorta. I have seen no case of aneurysm, though I believe one or two examples have been through the wards. Of post-rheumatic cases there have been quite a number. Many of these were

obviously of long standing, but a few are traceable to rheumatic infection acquired, or at least manifested, since the outbreak of war. With one or two exceptions they have been cases of moderate severity, showing only a little enlargement of the heart and some mitral incompetence. The rheumatic group has also included several men with signs of aortic incompetence, and a few with evidence of mitral stenosis. I have seen no case of organic disease which can be directly traced to pure overstrain.

It might seem easy, at first sight, to decide what to do with these men. Anyone with organic heart disease should, it may seem, be discharged forthwith from the army. But since the prime consideration is whether or no the man is of most value to his country in the army or out of it, the problem is not quite so easy as it looks. Obviously men with pronounced cardiosclerosis associated with high tension are unfit for any kind of military service, and the same is true of cardiac syphilis. In both the symptoms are almost sure to get worse quickly, and the man will become useless to the army, whereas he is still fit for years of work at home. In cases of rheumatic origin, most men with pronounced valvular lesions are of more service to their country out of the army than in it. Occasionally one meets with a case of aortic regurgitation or of mitral stenosis in a man who may be usefully employed at home in training recruits, or even in general home service. In arriving at such a decision as this one is naturally influenced by the man's age, his term of service, and to some extent by his own inclinations in the matter. It is in patients with little or no dilatation of the heart, and a mere systolic bruit at the apex, that most of the difficulties arise. Many of these men improve considerably in hospital. Those who have no symptoms, whose lesion is found accidentally, may be safely returned to duty. For others, who complain of dyspnœa on exertion, and in

whom there is manifest cardiac enlargement, home service may be at least tried. The chief point is that no man should be discharged merely because he has *signs* of cardiac disease ; *symptoms* are more significant than signs. Each case must be judged on its merits.

* * * * *

A much larger group of cases consists of those who fall for the most part under the heading of " D.A.H." We have seen a great many of these, far more than in civil practice. Unfortunately, I have been able to get at my notes on only twenty-five examples of this syndrome. With these as a basis I will briefly describe the condition which they exemplify.

Ætiology.—The average age was 24, 76 per cent. of the men being 25 or under. A similar percentage was derived from infantry units. More often than not the patients are of slender physique. Various causes were assigned by the men themselves. Several had felt symptoms during training. In one or two some special effort or exertion was blamed, while others thought it was the outcome of the general stress, physical and emotional, to which they had been exposed. Here it may be remarked that the cases are more frequently met with among the Gallipoli men than among those from Flanders. In two cases the onset was directly attributable to shell shock, and in two others it was as certainly consequent on a wound. One man thinks his symptoms are due to excessive smoking during convalescence. This tobacco factor is not by any means discoverable in all cases. Yet it seems to me that many of these men, or boys, as some of them are still, are smoking too much in hospital. Finally, the symptoms appeared in some cases during convalescence from some acute infection, such as dysentery, from typhoid fever, or malaria. Some of the men seem to me to owe a

fraction of their subjective discomforts to the attention which they bestow on their hearts after they have been told —unwisely, as I think—that something is wrong with the heart.

Pathogenesis.—In the absence of any direct anatomical evidence, such data as are at present available must be pieced together. To begin with, there is no evidence in any of the cases I have seen of structural alteration in the heart itself, except of a mild, general dilatation, which—in some, at any rate—appears to be transient. On the other hand, there are distinct indications of a nervous or supracardiac origin. (1) The origin of the symptoms is often traceable to nervous shock or stress. (2) The pulse acceleration, which is so characteristic a feature of the syndrome, is subject in a majority to nervous excitation. (3) Certain of the more prominent physical signs, as will be shown below, are those associated in civil practice with states of nervous excitement. (4) The condition we are describing is often associated with other manifestations of an exhaustion neurosis. Of course, it is possible that there may be an intermediate toxic or even bacterial factor, and that nervous stress merely liberates some toxin or permits of some infection by which the symptoms are immediately provoked. Even so, however, the nervous factor is by far the more important.

Symptoms.—The onset may be abrupt, and traceable to some definite event; or gradual, even coming on during rest in hospital or convalescent camp. There are three chief symptoms, dyspnœa with exertion or excitement, palpitation, pain or other forms of cardiac discomfort, also increased by nervous or physical stress, and giddiness. Headaches and sleeplessness are also complained of by some. In a few the hands are cold and blue, but this is by no means universal. In many cases there are no subjective symptoms. If a number of wounded, or convalescents from dysentery, be

examined, the irritable pulse and other characteristic features of the syndrome are found in quite a large percentage.

The pulse variations constitute the most remarkable and constant feature of these cases. These variations may be noted under three headings: (1) The average rate is quicker than normal (over 80 per minute in over 80 per cent. of the cases). (2) The rate of the pulse varies widely from day to day, and even from minute to minute. The ward charts show this. In one of my cases the rates charted varied from 80 to 136, in another from 72 to 100, from 56 to 92 in a third, and so on. (3) The pulse is accelerated with notable readiness by comparatively trivial physical and psychical stimuli. The physical stimulus most easily applied is a change of posture. In one of my cases the following remarkable variations were recorded. The rate while the patient lay flat in bed was 132 per minute. When he sat up the rate increased at once to 156, and stayed at this rate for at least two minutes. When he stood up by the side of the bed it increased to 192 per minute, and a true alternation of beats became apparent, together with pallor and giddiness. For several minutes after he lay down again this high speed persisted. This is an extreme case, but the same increase of pulse rate with alteration in posture, persisting abnormally, is highly characteristic. Emotional or psychic stimuli are rather more difficult to improvise. The patients are, nevertheless, well aware of the fact that excitement causes a notable increase in the rate of the heart. One curious example of this is to be found in the fact that the pulse rate as measured by the medical officer during his round is invariably faster than the average rate in the chart; the interpretation, to which the patients themselves confess, being that the medical officer, with powers of discharge to duty, to subsidiary hospital, and so on, is a more formidable person than the

sister, who is responsible for the pulse rates on the chart. The pulse is often irregular also, the arrhythmia being of the "sinus" type, *i.e.* it is due to causes operating through the supracardiac nervous mechanism, and not inherent within the heart itself. In a few cases extra systoles occur.

The *physical signs* are of some interest. The apex beat is forcible and diffuse, and extends too far to the left. Sometimes also it spreads downwards into the sixth interspace. There is, in fact, an apparently "inorganic" dilatation of the ventricles. Beside this there are limits of several kinds. These may be divided into three types: (1) A systolic murmur, brushing in quality, heard over a limited area, with its centre at or near the apex beat. This varies little with posture and respiration, but disappears after days, weeks or months. (2) A cardio-respiratory bruit heard at the apex, along the left border of the heart, loudest during inspiration and with the patient in the erect posture, diminishing and even disappearing when the patient lies down and also during expiration. The resultant sound heard on auscultation is comparable to an interrupted jet of air or vapour during inspiration, dying off into silence during expiration. This is a very familiar accompaniment of nervous states in civil practice. I have described it fully elsewhere, and given reasons for assigning to it a pleuro-pericardial origin. The other types of limit, (1) and (3), own, I believe, a similar source. They tend to vary from time to time as type (2) does, and they have the same "near-to-ear" quality. In type (3) the bruit is also systolic, and as in (2) varies in intensity with posture and respiration; but it is heard chiefly along the left border of the sternum, and at the pulmonic cartilage. Types (2) and (3) may be heard at the same time, or they may alternate in the same case. In all three types the bruit is apt to occur later in systole than an ordinary mitral regurgitant murmur, and it may even have a "pre-diastolic"

position in the cardiac cycle, running into and overlapping the second sound. In some cases no murmurs are heard at all. The first sound at the apex is nearly always accentuated.

Diagnosis.—The one great pitfall for the unwary is the ease with which these conditions are misinterpreted as examples of organic diseases of the heart. Of the twenty-five cases spoken of here no less than seven came to us with a diagnosis of "V.D.H."—a fact of some importance in intensifying the patient's nervous instability. I have several times written down a case at the first rapid routine examination as organic, and likely to need a medical board, only to find, three or four days later, that the signs were already modified, and the condition manifestly "functional." To guard against mistakes of this kind the following points should be recollected. (1) No one should be condemned as a case of "V.D.H." on the strength of a murmur alone. To do so is an act of malpractice. (2) Every murmur should be studied in its relation to respiration, and in at least two postures, the erect and the recumbent. (3) Just as certain bruits are characteristically organic, others—such as those described above under (2) and (3) in "Diagnosis"—are characteristically "functional." (4) Often one examination is not enough. Diagnosis should be reserved till several have been made at intervals of three or four days or longer. (5) The presence of the "irritable pulse" is always suggestive of non-organic disturbance.

Prognosis.—Many of these men improve quickly in hospital. A few, however, persist in defiance of rest and all other attempts at treatment. Their ultimate fate is uncertain. Certain physicians who watched cases of the kind during the Balkan wars assert that if they are not cared for they drift into a state of permanent arterial thickening with cardiac hypertrophy. My own experience is

not extensive enough in point of time to justify any statement, but it has at least shown me how obstinate and damaging to the soldier's career this condition of irritable heart may be.

Treatment.—So far I have failed to find any drug that is of use, with the possible exception of bromides. The one measure that has any effect is rest. This does not necessarily imply a long period in bed, though it is well to keep all such men in bed for a few days if possible, for the sake of observation. After this, if the average pulse-rate is not over 100 they may be allowed to get up gradually, so long as they do not undertake any of the heavier ward work. The great point is to allow them a very long convalescence, of some weeks or even months. It is the mental rest thus secured that helps them most. If at the end of their time they have improved sufficiently they should be discharged to home service. Patients of this kind are never fit to go straight back to the nervous and physical stress of active service at the front. In some cases it is to be feared that they will never be fit for this. After a reasonably long probation they should be discharged from the army if shortness of breath still follows on moderate exertion and excitement. They will be more useful to the country making shells than being morally and physically knocked down by them.

One word may be said as to tobacco. On active service and during convalescence these men smoke a great deal. So far as is possible this should be controlled, especially in the case of the younger soldiers.

REFERENCE.

Quart. J. Med., January, 1912, vol. v., No. 18.

REMOVAL OF BULLETS AND OTHER METALLIC FOREIGN BODIES.

BY

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THE first essential in removal of bullets and other metallic foreign bodies is exact localisation in the dark room of the skiagraphist. The method used at the Second Southern General Hospital is that described by Capt. Thurstan Holland as Hampson's modification of Mackenzie Davidson's method.[1]

There are four points which I should like to emphasise in his description of this method :—

1. Every case should be carefully screened by a skilled skiagraphist accustomed to the work of localisation.

2. In determining the direction of the "central ray" the smallest diaphragm must be used.

3. It is essential in all difficult cases that the operator should be present when the localisation is made, as it is of paramount importance that the patient should be in the same position for operation as when the localisation was carried out.

4. The localisation should be made as short a time as possible before operation, owing to the liability of the metallic body to shift its position.

Various methods of marking the skin have been tried and found wanting. The marks should be small and not capable of being washed out or got rid of in preparing the skin for

[1] *Archives of the Röntgen Ray*, No. 175, Feb. 1915, pp. 310-16.

operation. The method of marking found most satisfactory is a small cross made with a sterilised surgical needle.

When the patient is anæsthetised and ready for operation the second essential in successful removal is to be able exactly to identify the position of the bullet before incising the skin. At the Second Southern General Hospital we use an apparatus figured in the accompanying diagram. The

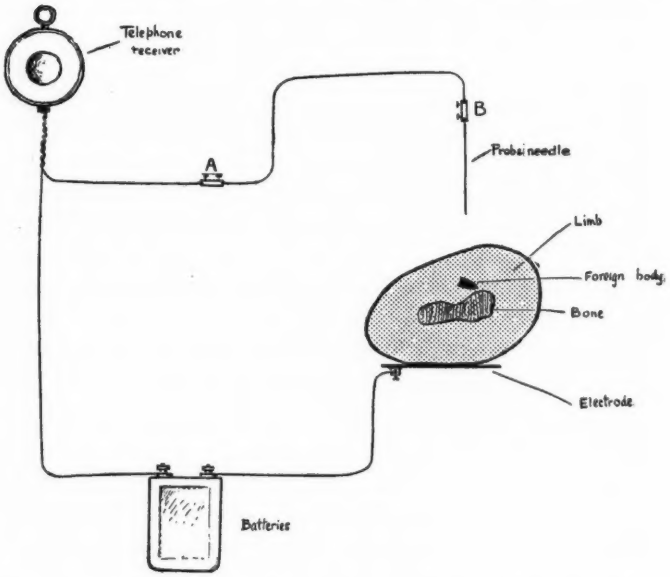

diagram sufficiently explains its use. In actual practice the electrode, shown attached to the limb being explored, is always attached to another limb. The probe-needle and portion of wire beyond the junction A are sterilised. The telephone receiver is held against the telephone operator's ear, the current turned on and the probe-needle passed through the tissues in the direction indicated by the marks previously made on the skin by the skiagraphist. When the

needle touches the metallic body a characteristic " tap, tap, tap," is heard in the receiver.

The advantages I claim for this particular type of bullet searcher over any other pattern are :—

(i.) There is only one pole to strike the metal.

(ii.) The pole consists of a sharp, long needle.

(iii.) No skin incision is necessary for the detection of the metallic foreign body.

(iv.) No damage is done to the tissues, as if no metallic foreign body is detected no incision is made.

(v.) That portion of the apparatus which approaches the area of operation is simple and inexpensive, easily replaced at once, and can be readily sterilised.

As soon as the operator in charge of the telephone notifies that the needle has struck metal the current is turned off and the skin incision is made, with the needle as the centre point of the incision. The length need not be more than comfortably to admit an exploring finger if necessary to insert it. The centre of each side of the incision is then fixed to the edges of the towel by towel-forceps, which serve also as retractors. The incision is then carried inwards, using the needle as a guide until the metal body is struck by the scalpel. The bullet or piece of shrapnel is then grasped by a pair of forceps or is caught between the tip of the little finger and a gall-bladder scoop and lifted out.

The only retraction of tissues permissible in addition to that obtained by the towel-clips is carried out by the assistant with a small, flat retractor on the side of the incision away from the operator. Any undue use of retractors or blunt dissectors or free use of a finger, more often than not, results in the bullet being drawn or pushed to one side of the line marked by the telephone needle. Should this happen, the current must be switched on again and attempts at extraction deferred until the telephone operator signifies that the needle

is in contact with the bullet. Care is needed to protect the needle and wire from contact with any surgical instruments in the field of operation, as such contact will at once convey a message of metallic finding to the telephone operator. Where the bullet is situated in an abscess cavity pus escapes as soon as the scalpel enters the abscess. If the abscess is a large one the position of the bullet may be considerably altered by the collapse of the cavity. An index finger will then easily detect the bullet as it is lying free in the cavity uncovered by muscle.

When the bullet is embedded in a large muscle it is extremely easy to miss it altogether for two reasons :—(i.) it is practically impossible, when it is covered by even a thin layer of muscle tissue, to feel the bullet unless the operator can fix it between his exploring finger and a firm resisting body such as a bone. (ii.) when the needle is used in searching for the bullet with the current turned on, it causes contraction of the muscle in which the bullet is embedded. The contraction will often carry the bullet to one or other side of the guiding line laid down by the skiagraphist, and unless the depth of the metal has been carefully marked by the surgeon on his needle before commencing, its point will pass too deeply and the bullet be missed.

The first of these possibilities of failure is quite easily overcome or avoided by following the rule to use retractors and exploring fingers as little as possible, or not at all until the knife following in the line of the needle itself strikes the bullet.

The second possibility is overcome as soon as the cause of the failure to strike metal is realised, the needle being partly withdrawn and then pushed down to the measured depth to one or the other side of the skiagraphic line. Sometimes if the bullet is in muscle it may become displaced between the time of localisation and operation.

A third cause of failure is peculiar, and takes a little time to tumble to. The foreign body stated by the wounded man to have resulted from a gunshot wound, and which is well shown in skiagram and felt by the operator with his exploring telephone needle, fails absolutely to give the signal of metallic finding to the operator. The possibility of the foreign body being a piece of stone or other material somewhat opaque to X-rays must be borne in mind. This was brought forcibly to my notice by the suggestion of Capt. Taylor in a case in which a piece of material in the chest-wall on three different days failed to give a metallic finding signal to the telephone operator.

There is nothing more depressing for a surgeon than to know that he has failed in accomplishing the object with which he commenced his operation, but where the operation has not actually been commenced the depression need not be present, for no harm has been done to the patient. Unless I can obtain the metallic finding signal after a careful search with the needle between the fixed points laid down for me by the skiagraphist, I send the patient back to bed and have a fresh localisation carried out next day.

We have often to decide whether or not a bullet or piece of shrapnel is best removed or best left alone.

1. All superficial metallic foreign bodies which cause any discomfort or are likely to give trouble from their presence should be removed.

2. In gun-shot wounds which do not heal, or where sepsis continues, if a foreign body is present it should be removed.

3. Deeply-situated bullets or pieces of shrapnel should be removed from limbs if of large size and causing any inconvenience. If causing no inconvenience, leave alone.

4. Those situated within the thorax, unless easily reached, are better left alone. I have seen two cases, with no

symptoms, in one of which a round shrapnel bullet was lying on the summit of the arch of the aorta, in the other a piece of shrapnel casing was lodged on the right side of the arch. Both were left alone.

5. In the abdomen, if found on repeated localisations to be in the same position, the bullet should be removed. If on repeated examinations it is found in different parts of the abdomen, it is probably free in the peritoneal cavity, and can be removed generally from the pelvis if the man has been walking about. Bullets so placed are treated much in the same way as other foreign bodies in the abdomen. Dame Nature wraps them round with adhering coils, and eventually they will be extruded *per vias naturales*.

6. In the head. Those situated in the scalp, in the face, or in the bony case of the skull should be removed, and in the latter portions of depressed inner table looked for. If situated within the brain itself it is impossible to lay down general rules. If the wound is septic around the bullet, a large area of brain necrosis may be extruded, and the patient dies suddenly. Where situated immediately under the skull, provided it has been carefully and accurately localised, the bullet should be removed by the shortest route.

To sum up :—

1. Never attempt to look for a bullet or shrapnel without having had it carefully localised, and if likely to be a difficult case be there yourself.

2. Make no incision unless the metal has been located by the telephone needle, but send patient back to bed for fresh localisation.

3. Disturb the deep parts of the wound as little as possible with retractors, fingers or blunt dissectors until the foreign body is exposed, and then lift it out with care, not to damage the tissues through which it is withdrawn.

THE LONG FOX LECTURE:

THE TWELFTH ANNUAL LECTURE ARRANGED BY THE COMMITTEE OF THE LONG FOX LECTURE,
DELIVERED IN THE PHYSIOLOGICAL LECTURE THEATRE OF THE UNIVERSITY OF BRISTOL ON DECEMBER 1ST, 1915.
THE VICE-CHANCELLOR *in the Chair.*

BY

F. RICHARDSON CROSS, M.B. Lond., F.R.C.S.,
Senior Surgeon to the Bristol Eye Hospital;
Consulting Surgeon to the Bristol Royal Infirmary.

ON

THE EVOLUTION OF THE SENSE OF SIGHT.

EDWARD LONG FOX was born in 1832; he died on March 28th, 1902. Having obtained a First Class in the Natural Science Schools at Oxford, he studied medicine in Edinburgh and London. He graduated M.B. in 1857, and the same year was appointed Physician of the Bristol Royal Infirmary, which post he retained until 1877. His grandfather, Edward Long Fox, had held the same position for thirty years.

He was President of the British Medical Association in 1894.

He was a student of science and a sound practitioner of medicine, ever extremely attentive to his cases whether in hospital or in private, and he was a personal friend as well as adviser to his patients. He published many valuable papers on medical subjects, and would have done even more had it not been for gout and indifferent health. He was for several years the acknowledged head of the medical profession in Bristol, and possessed the full confidence of all his colleagues. Generous in his hospitality, and in his charitable support of hospitals and other deserving objects, his influence and effort were always available for any good work, and he helped in secret many poor and struggling individuals. He was always kind and helpful to young men

starting in the profession, and I am indebted to him for very many acts of kindness and hospitality.

Dr. Fox was an exceptionally handsome man with a great charm of manner, and at his death a very large circle lost a beloved personal friend, the profession of medicine one of its most trusted leaders, and the City of Bristol an honoured and valuable fellow-citizen.

In the lowest forms of animal life the whole surface is equally influenced by light. The most simple organ of vision would arise in some limited area often with a deposit of pigment. A thickening of the cuticle over the sensitive area would form a primitive lens and tend to concentrate the light upon it. From such a simple form of visual organ it is easy to elaborate gradually an eye capable of true vision.

The percipient elements of the eye are modified cells, one end of each continuous with a nerve, while the other terminates in a cuticular structure or indurated part of the cell, forming what is known as the rod or cone.

A. The **Protozoa** (unicellular) consist solely of sarcode, or animal protoplasm, displaying the essential properties of vitality, even those of movement and irritability, but they possess no organs, no distinction or separation of structures or parts.

The substance of the body is not differentiated into histogenetic elements, *i.e.* into cells or nucleated masses of protoplasm, which by their metamorphosis give rise to tissues.

The first step in the process of higher development is the conversion of more or less of the protoplasm of the ovum into such cells. These multicellular developments constitute the great division Metazoa—sub-divided into invertebrata and vertebrata.

B. **Metazoa.**—There are but few groups of the Metazoa which are not provided with optic organs of greater or less complexity.

In most instances these organs are placed on the anterior part of the brain, and are innervated from the anterior ganglia; but in other instances they may be found situated here or there in different parts of the body. Some may permit of the *perception of objects*, while others possess a *mere perception of light.*

I.—In the **Coelenterata** some definite organisation is manifest. As their name implies, they possess "a hollow bowel," that is a distinct somatic cavity within the body with a mouth, but no formed intestine nor anus; thus there appear two definite membranes, an ectoderm and endoderm, and muscle fibres are found in many species.

No nervous system has been differentiated, but the cells of the ectoderm may be specially modified, and give rise to nerve elements or to primitive organs of special sense. Pigment spots, eye specs, or ocelli are found in some Medusæ and Actinozoa, or short nerves distributed to pigment masses formed at the bases of the tentacles.

Thus in Lizzia a simple eye is placed at the base of a tentacle. It consists of a local thickening of the cuticle constituting a lens, and under it a percipient bulb which contains three kinds of cell elements — *pigment cells*, others suggestive of *retinal elements*, a peripheral process resembling a rod attached by a central fibre with *ganglion cells* that lie beneath it.

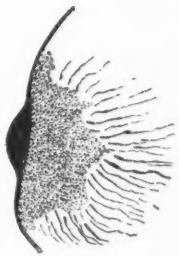

FIG. 1.—LIZZIA KOELLIKERI. (From Balfour, after Hertwig.)

II.—The **Annuloida** have a complete alimentary canal shut off from the body cavity, and a primitive kind of water vascular circulation. They possess a distinct nervous system of epithelial origin usually found in the form of a ganglionated cord.

(*a*) In the *Echinodermata*, starfishes, sea cucumbers, etc., a nervous ring surrounds the gullet, and sends branches to each of the rays. The branches are probably sensory in function, and at some of their extremities is a pigment spot, which may well be a rudimentary organ of vision or ocellus.

(*b*) The *Scolecida*, or worms, show two præ-oral nerve ganglia united by a commissure, and giving off filaments in various directions. Pigment spots or rudimentary eyes, from two to sixteen, are often present, more or less close to the central ganglia.

(*c*) In the *Rotifera* there is a bilobate cerebral mass which for its proportionate size may compare with the brain of some of the higher vertebrata.

III.—**Annulosa :** Anarthropoda ; Arthropoda.

ANARTHROPADA.—In the *Annelda*, earthworms, leeches, etc., a nervous system is present, a double chain of ganglia running along the ventral surface of the body. The pair of præ-oral cerebral ganglia situated in the head (prostomium) vary in size and complexity entirely with the degree of

FIG. 2.—ANNULOSA (after Nicholson).

development of the cephalic sense organs. The cerebral ganglion is often large and complicated, but it does not control or co-ordinate the other ganglia ; its removal causes no appreciable change in the actions of the animal.

In many there is a fore and hind brain, the latter the centre of vision for the nerves to the eyes and tentacles.

The eyes of *Annelida* sometimes are mere pigment spots or ocelli placed in varying parts of the animal. Others have very perfect cephalic eyes.

In *Sagitta* they are on the head formed in a mass of pigment, with three lenses partially embedded in it, each lens associated with a rod, the retina being composed of rod-bearing cells.

The cephalic eyes of *Alciope* are highly developed, and somewhat resemble those of fish. They have a large lens adherent to the cuticle; a simple, well-pigmented retina with rods and nerve fibres connected with an expansion of the optic nerve. A well-marked fluid vitreous chamber occupies the interior of the eye and separates the lens from the retina.

ARTHROPODA.—The cerebral ganglion gradually increases in size and complexity of structure as the cephalic sense organs become more perfect, and the intelligence more pronounced. The optic ganglia become more complicated, and central nerve swellings associated with the antennæ are present. These become homologous perhaps to the olfactory lobes of vertebrates, while certain other peculiar cerebral areas are developed which may be associated with the growth of the intelligence.

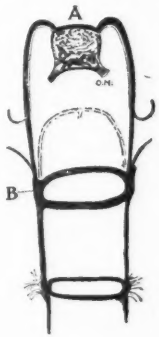

FIG. 3.

(*a*) In the *Crustacea* the nervous system is of the normal homogangliate type, consisting of a longitudinal series of ganglia of different

sizes united by commissural cords, and placed along the ventral surface of the body. The organs of sense consist of eyes, antennæ and in some of auditory sacs. The first pair of ganglia fuse together in a small quadrilateral body which is situated above the mouth. It gives off nerves to the eyes and to the upper antennæ. The second pair of ganglia and their commissures form a ring around the œsophagus.

In the *Lobster* the cerebral ganglion shows considerable complexity of structure. Three regions can be traced in it.

The *protocerebrum* consists of the optic ganglia and of lobes, which form a cerebral mass, partially divided by a median furrow and traversed by commissural fibres.

This complicated structure of the cerebral ganglion is apparently mainly due to its connection with the highly-developed eyes, or other less obvious sense organs, but its removal seems to destroy the capability of spontaneous locomotion, so that probably it possesses in some degree the power of controlling or perhaps even of initiating activities in the rest of the nervous system.

In the *deutocerebrum* there are two pairs of centres united by a commissure ; they probably control the first pair of antennæ, which may possess some rather complicated functions.

The *tritocerebrum* constitutes the centre for the second antennary and the tegumentary nerves.

In the *King Crab* the nervous system is concentrated around the oral end of the œsophagus into a single large ganglion, from which nerve filaments are sent to all parts of the body.

The anterior portions represent the cerebral ganglion. Anteriorly it projects as a slightly bilobed mass (the protocerebrum), from whose anterior end optic and ocellary nerves are given off to the lateral and median eyes, and to a special

region in front of the mouth. There is also a great development of neurophile and ganglionic nuclei on the upper part of the protocerebrum, forming a kind of brain hemisphere, which is separated along the median line, but to which apparently no useful function can be assigned.

(*b*) (*c*) In the *Arachnida* and *Myriapoda* there is a similar concentration of the nerve ganglia around the oral end of the œsophagus. The cerebral supra-œsophageal part of the mass is bilobed, and innervates the median and lateral eyes, which are always sessile, and in the form of two to eight more or less simple eyes or ocelli.

(*d*) *Insecta*.—In these the head, thorax and abdomen are quite distinct. Five or six somites constitute the head, which possesses one pair of antennæ, a pair of eyes, and a mouth. The organs about the mouth are very complicated, and used either for mastication or suction or for both.

The nervous system consists essentially of a chain of ganglia placed vertically and united together by longitudinal cords and commissures.

The cephalic supra-œsophageal ganglia of insects are of large size. They consist of a pair of *protocerebral* lobes in connection with the optic ganglia, the size of the brain depending mainly upon the degree of development of the eyes. A second pair of centres, the *deutocerebrum*, are probably (? olfactory) in connection with the antennæ, while the *tritocerebrum* is closely associated with the sub-œsophageal ganglia by means of connectives which form a collar round the gullet, and supply the parts in the neighbourhood of the mouth.

Each *protocerebral* lobe contains a large "fungiform body," which is in close relation with other parts of the brain by means of commissural fibres, with its fellow of the opposite side, with the optic ganglia, and antennary lobes, and with a commissural band known as the "corpus

centrale," to which as a nucleus fibres from all parts converge.

In spite of the evident importance of these "fungiform bodies," their function is not well known, but it is noteworthy that within the same order their size increases roughly in proportion to the intelligence of the insect; and among the several families they may even vary in development; for instance, between the persons of the society, being proportionately larger in the working bee than in the drone or queen.

In the *Hornet* the cerebral ganglia are large, but mainly because of the size of the *protocerebral* lobes in association with the great compound eyes that it possesses, and partly because of the high development of the fungiform bodies.

It is not easy to explain the very high development of communal life that exists among the higher insects, the bees, the ants and the termites, without supposing that they possess to some degree a measure of high psychical endowment. The organs of sense are the eyes and antennæ. The eyes are usually compound, and are composed of a number of hexagonal lenses united together, and each supplied with a separate nervous filament. They may be placed on peduncles, but in no case are these movably articulated to the head, as is the case in some crustaceans. In addition to the compound eyes, simple eyes, or ocelli, are often present, placed between them on the top of the head, or these latter may be the sole organs of vision, or in a few cases eyes do not exist.

THE EYES in the *Arthropoda* show several different separate types, their features of similarity perhaps depending more upon the character of the exoskeleton than on any origin from a common prototype.

There is a crystalline lens always closely adherent to the

cuticle, and a retina continuous by fibres from the optic nerve, containing a layer of rods and well-marked pigment.

The percipient elements appear to be sometimes formed from the epidermis, at others from the central nervous system.

In some of the classes the eyes are *simple*, in others the eyes are *compound*.

SIMPLE EYES.

(*b*) In the *Arachnida* the organ of vision consists of from two to eight or more simple eyes or ocelli, and they are always sessile.

In *Trachearia*, the mites and ticks, which breathe by the general surface of the body or by the tracheæ, the eyes are never more than four in number.

In *Pulmonaria*, scorpions and spiders, which breathe by pulmonary sacs, the eyes are never less than six.

(*c*) The *Myriapoda* possess a variable number of simple sessile eyes behind the two antennæ. In this group are Chilopoda, carnivorous centipedes.

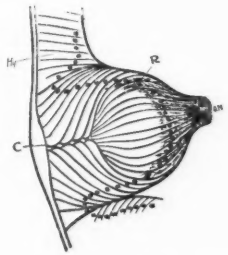

FIG. 4.—CHILOPODA (after Balfour).
Hy—Hypodermis. *C*—Cornea.
ON—Optic Nerve. *R*—Retina.

These simple eyes vary considerably in detail. Three types may be indicated.

1. The retinal cells lie immediately behind the lens without any intervening vitreous space or structure, as in the Tracharia.

2. The retina is separated from the lens by a distinct layer of cells from the hypodermis, which may be considered to be a solid vitreous humour. These are seen in the Arachnida, in the simple eyes of Insects, and in some Centipedes.

3. In other Centipedes and in Insect larvæ the cellular

vitreous humour is formed as above from modified hypodermic cells; but the *retina seems also to be derived from the hypodermis itself*, though as is usual its outer ends terminate in rods, and their inner ends are continuous with nerve fibres which pass from the pre-œsophageal nerve ganglion.

The optic *nerve fibres* in the simple eyes of Invertebrata lie *behind* the retina, and the percipient elements (rods) are directed toward the light. But it is opposite in the Vertebrata, here the fibres from the nerve form a layer *in front* of the rods and cones.

COMPOUND EYES.

(*a*) (*d*) The *Crustacea* and adult *Insects* almost always possess compound eyes. In Crustacea the eyes may be sessile, but are usually borne on stalks attached to the first segment of the head.

In many of the larvæ there is a median eye, but after full development they are usually paired.

In the *Cyclops* and water fleas the large median eye remains permanent. In the extinct *Eurypteridæ* there was a pair of larval eyes near the centre, and also a pair of large marginal eyes in addition.

Compound eyes consist of an optic nerve terminated by a ganglionic swelling; this swelling has impinging on it several layers of cells, the deeper of which form a large number of elongated axial rods or "rhabdoms," the percipient elements which together constitute the structure known as the "retinula." Each rod has its own lens, which consists of a crystalline transparent cone, and on it a corneal lens facet which is developed from the cuticle.

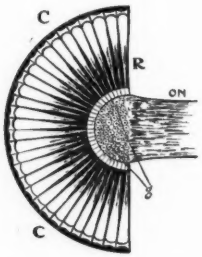

FIG. 5.—COMPOUND EYE.
R—Retinulæ with rhabdoms.
g—Ganglion cells.

The optic nerve is connected with and is probably an outgrowth from the cephalic lobes of the pre-œsophageal ganglion, while the epidermis in the region of the future eye forms the corneal lenses, and growing columnar cells, gives rise to the crystalline cones beneath them.

Each eye forms a prominent mass on either side of the head.

The lens facets may number 50 in each eye in the case of *ants*, while in the *house fly* there may be 5,000, and in the *beetle's* eye as many as 25,000.

V. **Mollusca.**—The nervous system and the eyes vary considerably in their development.

The lower types, the *Molluscoida*, show only a single nerve ganglion. Some have no eyes, others possess pigment spots or ocelli placed between the oral tentacles or along the margins of the mantle lobes.

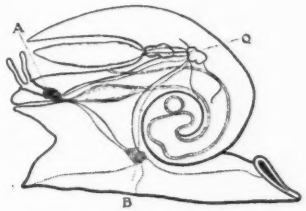

FIG. 6.

A—The *Cephalic, Cerebral, or Supra-œsophageal* ganglia. *B*—The *Infra-œsophageal ventral or pedal* ganglia. *Q*—The *Parieto-splanchnic or "Pleuro-visceral"* ganglia.

In the *Mollusca* proper the nervous system tends to be centred in three pairs of ganglia united to one another by commissures and connectives (cerebro-visceral, cerebro-pedal), which are somewhat irregularly placed.

A The *Cephalic, Cerebral*, or *Supra-œsophageal* ganglia.

B The *Infra-œsophageal ventral* or *pedal* ganglia.

Q The *Parieto-splanchnic* or *"Pleuro-visceral"* ganglia.

Nerves are given off from the cerebral ganglia to the head, to the sense organs, eyes, otocysts, tentacles and lips.

In some the two cerebral ganglia are closely paired and concentrated to form a bilateral mass of brain. The pedal

and pleural ganglia are blended to form a circular pleuro-pedal mass around the œsophagus, from which centre nerves pass to the various parts of the body.

The *Encephalous Molluscs* have eyes that vary in complexity. They are present in the head, and innervated from the cerebral ganglion.

In the *Gasteropods* and others the eyes approach the vertebrate type, but are comparatively simple. A closed vesicle lined by retinal cells contains a large spherical lens which is in front in contact with the outer integument, modified to constitute the cornea.

Some snails have a very well marked-out head, a pair of eyes placed on stalks, and tentacles which may be for smell rather than tactile organs, sometimes they also have auditory capsules.

Most of the *Cephalopoda* are very highly organised. They possess considerable power of locomotion by means of the eight or ten arms that surround the central mouth. The head is very distinct, and the cerebral mass, which consists of the supra- and infra-œsophageal ganglia, is protected by a cartilaginous case or kind of rudimentary cranium. The most highly organised invertebrate eye is that of the Dibranchiate Cephalopods.

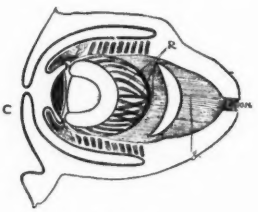

FIG. 7.

R—Retina. *C*—Cornea.
g—Ganglion. *ON*—Optic Nerve.

In the Cuttle-fish there is a kind of *orbit*, which contains the *optic ganglion* into which the *optic nerve* passes. The eye possesses a modified *sclerotic*, a *choroid*, *iris* and *ciliary muscle*, a *lens* and *vitreous humour*.

The *retina is complicated*. In front are *rods* and *granules* imbedded in *pigment*, posteriorly is a layer of *nerve fibres*

separated from the pigment by cells and connective tissue.

A *cornea* formed of cuticle may enclose the eye in front, or there may be an opening through it leading into the "anterior optic chamber," which is large and complicated and homologous to the aqueous.

VERTEBRATA.

One of the most obvious, as it is most fundamental, of the distinctive characters of the Vertebrata is to be found in the shutting-off of the main masses of the nervous system from the general cavity of the body. As in the sub-kingdom Annulosa, so in the Vertebrata, the body is composed of a number of definite segments arranged along a longitudinal axis.

But in all Invertebrate animals without exception the body may be regarded as a *single tube*, enclosing all the viscera and the nervous system also within the general cavity of the body.

In most invertebrate animals the lines of the nervous system are perforated at the gullet, so that an œsophageal nerve collar is formed. Almost all of the nerves and commissural bands are ventral or post-œsophageal, but there is nearly always one well-defined prœ-cesophageal ganglion which is the homologue of the vertebrate brain, though its functions are very limited, and are analogous probably to those of the mid-brain and thalamencephalon, their association with sight being perhaps the most important.

In the Vertebrata a *special tube* contains the cerebro-spinal centres, to separate them from the rest of the body. It is formed along the middle line by the appearance of the "primitive groove," with a rising above along each side, the "laminæ dorsales," which become more and more raised up till they meet in the middle line, and form the tube within

which the cerebrospinal nervous centres are developed. By this means the main masses of the nervous system are entirely shut off in a special tube from the rest of the body and superadded to the ventral cavity, which contains, both in Vertebrates and in Invertebrates, the alimentary canal, the hæmal system and the ganglionic or sympathetic nervous system.

Moreover, the floor of the primitive groove becomes developed into the chorda dorsalis or notochord. This remains persistent throughout life in the Lancelet and a few others, but almost universally gives rise to the vertebral column, the essential feature of vertebrate animals.

The *brain is developed* from the expanded upper end of the medullary tube. The primitive division of the nervous axis is probably not into brain and spinal cord, but the fore-brain is first separated from the parts behind it, the mid and hind-brain and the spinal cord.

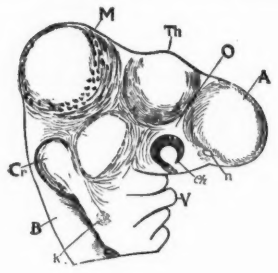

FIG. 8.
EMBRYO CHICK, THIRD DAY.
(After Balfour.)

A—Prosencephalon. *B*—Medulla oblongata. *Cr*—Cerebellum. *Ch*—Choroidal Fissure. *M*—Mid-brain. *O*—Optic Visicle. *Th*—Thalamencephalon. *V*—Visceral Folds. *k*—Auditory Vesicle. *n*—Nasal Pit.

In the embryo the length of the brain is very much greater than that of the spinal cord.

The fore-brain is histologically very distinct from the other parts, and the nerves coming from it have a different character from those of the mid and hind-brain. Moreover, the front end of the notochord is opposite the front of the mid-brain, in a line which separates the fore-brain with the thalamencephalon from the mid-brain. The mid-brain lies *on* the notochord, it is the homologue of the optic lobes, and contains the ganglia

of the oculo-motor nerves. The *mid-brain* remains single, while the hind-brain is a more complex structure giving rise to the "cerebellum" and "medulla," from which arise a large number of segmental nerves which supply the regions of the face and mouth.

The *fore-brain*, divided into "thalamencephalon" and "cerebral hemispheres," becomes highly developed in man and higher mammals in regard to some extent to the area of the surface or to the size of the body, but chiefly in accordance with the greater necessities and higher intellectual development of the individual.

I. **Fishes.**—The Lancelet has a persistent notochord. A brain is scarcely present, but the fore part of the nervous axis gives off nerves to a pair of very rudimentary eyes.

(*a*) In *Cyclostomi*, lower fishes, Lampreys and Hag Fishes, the brain is extremely simple, it may be said to remain in an embryonic condition. The individual vesicles lie in a line horizontally behind one another (? persistent notochord).

The "medulla" forms nearly half the brain, and from its roof arise the usual cranial nerves.

The "cerebellum" is a mere narrow bridge in front of the "Rhomboid Fossa." The mid-brain is relatively broad; it consists of a pair of prominent rounded eminences, the optic lobes, which from their outer surface give rise to the optic nerves. A band of fibres, the posterior commissure, marks the boundary between the mid-brain and the thalamencephalon; the latter is deep, and shows on its posterior surface gangula habenulæ in contact with pineal body (epiphysis), its inferior surface or floor is expanded down to form a capacious infundibulum. The sides are covered by the optic tracts, which pass downward and forward from the optic lobes to the chiasma in front of the infundibulum.

The thalamencephalon is continuous anteriorly with a

pair of lobes (the fore-brain or prosencephalon), from which the olfactory lobes open out.

(*b*) The *Elasmobranchii*, or cartilaginous fishes of Cuvier, show a skull and lower jaw well developed, but there are no cranial bones, and the skull consists of a cartilaginous box without sutures.

The nervous system and cerebral mass is more highly developed proportionately than is the case with any other division of the fishes.

The " thalamencephalon " is somewhat narrow, the optic lobe small compared with the Teleostan group. The " cerebellum " very largely developed, overlapping the " optic lobes " and " medulla." There is great development of the olfactory bulbs and peduncles very large and solid.

All the organs of sense are in a very high grade of specialisation. This order contains the shark, skates, rays and the dogfish, in some of which the visual organs and optic lobes are very strongly developed, in others weak.

(*c*) In the order *Teleostei*, which includes the great majority of fishes, the bony fishes of Cuvier, the skull is of an extremely complicated nature, being composed of a number of distinct cranial bones, and a mandible and lower jaw is invariably present.

The floor of the " prosencephalon " shows well-marked swellings or corpora striata connected by an anterior commissure, and covered over by a thin epithelial pallium.

The brain is smaller, and the olfactory portion unimportant. The " thalamencephalon " is very small and depressed between the mid and fore-brain ; there is a marked " epiphysis," the " infundibulum " and " hypophysis " with "saccus vasculosus" are strongly developed with lobi inferiores and a pituitary body.

The mid-brain is extremely large, the optic lobes are very strongly developed, and the nerves that supply the eyes

are well marked, while the olfactory region is peculiarly feeble.

As in all other fishes, the optic nerve crosses completely over to the opposite lobe. The nerves may be free at the chiasma, crossing one above the other, or they may interlace without association. The cerebellum is well marked.

The cod, brill, roach, salmon and carp are members of this group, and in detail different parts may vary greatly.

In the *Sole* the skull is twisted so that the two eyes lie on one side of the body, as the fins show, usually on the right. The optic nerves are equal in size.

"The left nerve passes above the right and twists round above the sphenoid bone to reach the left eye, which is displaced to the right side of the fish."

THE EYE IN FISHES has to be modified in accordance with the great density of the water medium through which the rays of light pass. The cornea being scarcely curved, assists but little in refraction; but this is compensated by the lens, it is a dense spherical body with a very high magnifying power. The retina is approximated to it by the flattened eyeball.

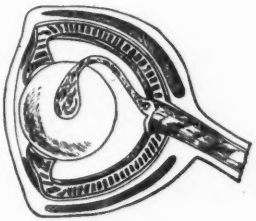

FIG. 9.

The aqueous humour scarcely exists, and the vitreous is small in extent. To protect the eye from varying pressure, from injuries and stormy seas, the sclerotic is strengthened by cartilaginous plates, or sometimes by a bony cup. The accommodation, which is limited in extent, takes place in Teleostii by means of a process of the choroid, the "processus falciformis," which is attached to the lens by the "campanula Halleri." This structure contains nerve,

vessels and smooth muscle fibres, which probably draw the lens towards the retina. It is the homologue of the pecten found in birds and reptiles.

II. **Amphibia.**—The brain on the whole is less complicated than that of any other Vertebrates, in some it is of very low type.

The hemispheres are cylindrical, and separated as far back as the anterior commissure, and connected to the simple thalamencephalon by a large basal tract. The olfactory regions are connected by a hippocampal commissure.

In *Urodela* the optic lobes are very weak, and in the Proteus Anguinus, which spends its existence in dark caves, it would seem that vision is altogether absent, and as might be expected, the optic lobes can scarcely be recognised. But in the Frog the optic lobes form the broadest part of the brain.

III. **Reptilia.**—The brain reaches a considerably higher stage of development. For the first time there is an undoubted cerebral cortex. The pallium is much larger than in an Amphibian, it is more highly developed,and also more highly differentiated. Some show a distinct hippocampal formation witha fornix. The olfactory bulband tract are well shown, or not, according to the degree of smell required by the individual.

FIG. 10.

A—Prosencephalon. *B*—Medulla oblongata. *Cr*—Cerebellum. *E.P.*—Pineal Eye. *M*—Mid-brain. *Th*—Thalamencephalon. *Epi*—Epiphysis. *Hypo*—Hypophysis Infundibulum. *Olf*—Olfactory.

The cerebellum is small, excepting in the Crocodile. The mid-brain has two well-marked optic lobes, showing a

tendency to sub-division into four, from which the optic tracts pass forward to the chiasma.

The "thalamencephalon" is hidden between the "prosencephalon" and "mid-brain." The *epithalamus* is well developed, especially in Hatteria, where is shown a well-marked pineal body with a parietal eye passing forward in contact with it. This eye arises independently from the brain above, from whence a rudimentary nerve passes into a pigmented retina, which is contained in a vesicle, the dorsal wall of which is thickened to form a lens. The vesicle, which may be looked on as an intraocular or vitreous fluid, is contained in a thickened capsule, the front of which is clear, like a kind of cornea. This eye is situated in the parietal foramen of the skull in Hatteria, and a similar structure is found among Lizards and in the embryo of the Vipers.

In many Reptiles the covering of the eyeball is peculiar. Lizards, Crocodiles, etc., possess eyelids, but Snakes and Reptiles do not; they show instead a mere scaly ridge surrounding the surface of the eye, which is itself covered by a layer of transparent modified epidermis. Under this lies a close, flattened conjunctival sac containing lacrymal fluid.

The epidermic or "autocular membrane" over the eye is shed together with the scaly skin, so that for some days the Snake is blind. The prominent large eye of the Chameleon is covered by the two lids, which coalesce to form a single circular membrane, in which is a small central palpebral aperture through which the eye can see.

IV. **Aves.**—In *Birds* the brain is remarkably constant in form. The cerebrum, optic lobes and cerebellum are large and wide. The cerebrum contains highly-developed corpora striata, and there are well-marked *pseudo-occipital lobes* and

smaller pseudo-temporal lobes. The olfactory bulbs are weak. The optic lobes and thalamus are very well developed; and there are strong and numerous fibres forming the *cortico-thalamic tracts* passing to the pseudo-occipital lobes, to the tectum opticum. The geniculate bodies are enormously developed. The optic tracts form a complete chiasma in front of the infundibulum.

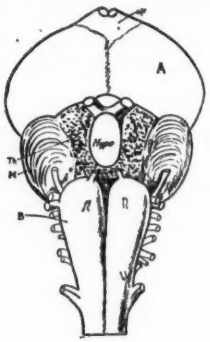

FIG. 11.

OWL'S BRAIN. ANTERIOR ASPECT. (After Wiedersheim.)
A—Prosencephalon. *B*—Medulla Oblongata. *M*—Mid-brain. *Th*—Thalamencephalon. *Hypo*—Hypophysis Infundibulum.

The thalamencephalon shows two rounded eminences, optic thalami, covered laterally by the optic tracts. All the nerve fibres pass in bundles through the chiasma to the opposite side of the brain; but in the Owl, with its strongly developed optic lobes and thalami, a few fibres are said to pass direct from each optic nerve to the tract of the same side, to allow of some binocular vision.

On the third day in the embryo chick the choroidal fissure near the optic nerve admits into the eye a vascular loop—this helps to form the vitreous humour. Later on it forms the pecten, which consists of fine blood vessels in connective tissue with a main artery and vein, it probably nourishes the contents of the eyeball, but is not concerned in accommodation.

FIG. 12.

IN BIRDS the cornea is very prominent, with a deep aqueous chamber. The antero-posterior diameter of

the eyeball can be elongated by means of bony plates in the sclerotic, which extend back from the margin of the cornea. These when compressed overlap, lengthen the eyeball and protrude the cornea, thus preparing it for near vision; while relaxation of the muscles allows of recession, flattening of the cornea, and fits the eye for distant sight.

The iris of birds is very pigmented, and is active in contraction of the pupil, and perhaps in accommodation.

In Mammals the sclerotic is never (?) supported by a ring of bony plates as in birds and many reptiles. But the eyes of Cetacea and of some amphibious Carnivora are built on a similar type to the eyes of fishes.

V.—The **Mammalia** are divided into *Placentals* and *Non-placentals*, and were grouped by Professor Owen into four classes according to the development of the structures of the brain.

(*a*) 1. *Lyencephala.*—Loose brained. The olfactory and optic lobes and the cerebellum are not covered in by the cerebral vesicles.

This class comprises the Non-placental Mammals, Monotremata and Marsupials. There is a large cerebral cortex which is smooth, and not very definitely linked up with other parts of the nervous system, few associated nerves coming from it. There is no corpus callosum, but the hippocampus is highly developed, with its dorsal and ventral (supra and proe) commissures, and is very characteristic of the brain in Marsupials and Monotremata.

Monotremata.—In the *Platypus* there is a poor visual apparatus. The optic and oculo-motor nerves and associated organs are small. Many of the animals are much in burrows, and the sense of sight is unimportant; smell is also unimportant; the olfactory bulb and tubercle and the pyriform are somewhat small. The *snout*, however, is very large, and

lined by special endings of the fifth nerve, which are enormously developed with the sense of touch.

In the *Spiny Ant-eater* the snout is large, but the fifth nerve unimportant. There is, however, *great development in the olfactory region*, and the rhinal fissure is very deep.

The optic thalami and mid-brain are well developed, but the geniculate bodies are absent, and the corpora quadrigemina weak, while the eyes and optic tracts are very small. There is no calcarine or splenial fissure in the Monotremata.

In the *Marsupials* the calcarine fissure appears, running obliquely above and behind the hippocampus. The occipital region is as yet unimportant. This splenial or calcarine sulcus is an early developed and important centre for vision ; it is absent or weak in the Wombat (Marsupials) and in most Rodents, but otherwise it is almost universally found as a definite feature in Marsupials and Placental Mammals.

FIG. 13.
MEDIAN SURFACE OF BRAIN.
a—Calcarine Fissure.

In Marsupials the Tasmanian wolf Thylacinus has a well-marked optic tract, corpora quadrigemina, and geniculate bodies attached to the optic thalamus.

(*b*) All *Placental Mammals* possess a corpus callosum. As the cortical areas of the brain increase in size this strong commissure becomes necessary, and it develops further with the importance of the hemispheres. With a stronger callosum the hippocampus diminishes, its anterior or cephalic extremity becoming weak and vestigial, while the posterior end continues to be large and important, even forming the hippocampus major of the lateral ventricle in man. Compare Figs. 40, 55, 76, *Royal College of Surgeons' Catalogue of Museum*, Physiological Series, vol. 2.

ERRATUM.

FIG 15.—Read MEDIAN "SECTION" *for* "SURFACE."

2. *Lissencephala.*—Smooth-brained, very few convolutions, cerebellum and olfactory lobes exposed.

Cheiroptera, Insectivora, Rodents, Edentata.

3. *Gyrencephala.*—Many convolutions, olfactory and cerebellum much covered.

Cetacea, Sirenia, Ungulata, Carnivora, Quadrumana.

4. *Archencephala.*—Overlapping brain. Man.

Insectivora, usually nocturnal and subterranean. The simple brain of the Hedgehog closely resembles that in Marsupials, there is an extraordinary development of the olfactory and of the pyriform lobes. Here, as also in the Mole, as might be expected in a blind animal, the optic parts of the brain are poorly developed. These parts can, however, be well recognised in the young mole, which possesses some power of vision.

In the *Galeopithecus*, Flying Lemur, the anterior quadrigeminal bodies are extremely large, bulging up between

FIG. 14.
MEDIAN SURFACE OF BRAIN.
a—Calcarine Fissure.

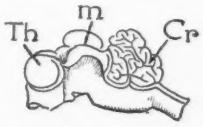

FIG. 15.
MEDIAN SURFACE OF BRAIN.
Cr—Cerebellum. *M*—Mid-brain.
Th—Thalamencephalon.

the cerebrum and cerebellum, and there is a large horizontal calcarine fissure.

Cheiroptera (Bats).—The organs of the brain are simple, and similar to those of the family above, the eyes are small, but the calcarine and intercalary sulci are well developed.

The *Rodents* have a large brain well supplied with blood, showing but few convolutions; possibly its large surface is sufficient for the needs of the members of the order without

any increase in the surface area, which is produced by the presence of sulci. These are practically absent, especially on the mesial surface, where even the calcarine sulcus is absent or insignificant. Yet the Beavers show much intelligence and ingenuity in their communal life.

In the Squirrels the optic nerve is large, and the anterior quadrigeminal bodies highly developed, though they are hidden by the large cerebral hemispheres. In the Rodents the orbit communicates by an opening in the septum, and forms a common cavity with the temporal fossa. The eyes are directed laterally outwards, and can move as easily backward as forward, as if to provide for escape rather than attack, and they have no sort of binocular vision.

In all Fish, Amphibia, Reptiles and Birds, with perhaps exception of the Owl and a few birds of prey, all the optic nerve fibres decussate from the retina of either eye to the opposite optic lobe. In the exceptions given a few direct fibres pass to the same side of the brain.

Edentata, one of the lowest orders, show considerable development of the occipital region of the brain with well-marked sulci.

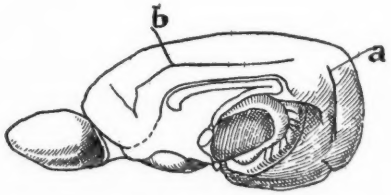

FIG. 16.—MEDIAN SURFACE OF BRAIN.
a—Calcarine Fissure. *b*—Intercalary.

The Armadilloes and Aardvark show a well-developed "complex splenial" sulcus, representing the calcarine, intercalary and genual, as is usually found in the Mammalia. The Sloths and Ant-eaters show a vertical calcarine separate

from the intercalary, as occurs in Primates and in Lions. The Pangolin also shows a separate vertical calcarine, and a retro-calcarine pushed back separately into the occipital lobe by the increase in the parietal and other parts of the brain hemispheres.

In the *Carnivora* the brain power is highly developed. The hemispheres pass forward over the olfactory bulb, and backward over the cerebellum.

Hearing is very acute, and we find a large mesial geniculate body, and large posterior corpora quadrigemina. In the fruit-eating Carnivora the eyes are at the side of the head, and they possess only a limited convergence, but in the *Felidæ* and others the eyes are set forward, and the pupil is very active, and there is some degree of binocular vision.

These animals require good distant vision, often when the light is dull, and they need also very reliable closer sight, and a most perfect co-ordination of the eyes with the fore limb by which they catch their prey. In the optic chiasma there are present considerable direct as well as decussating fibres.

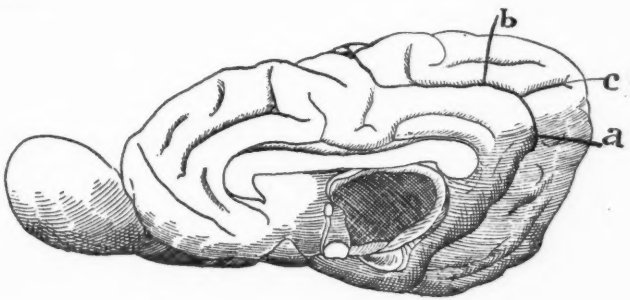

FIG. 17.—MEDIAN SURFACE OF BRAIN.
a—Calcarine Fissure. *b*—Intercalary. *c*—Retro-calcarine

A sylvian fissure is well developed, especially in the Lion. On the mesial surface, there is a deep calcarine sulcus below,

which joins the intercalary and passes up towards a crucial sulcus in the middle line, shutting off a posterior lobe from the rest of the brain, which lobe, I assume, is concerned in vision. The occipital lobe may be very well developed.

In some species there appear secondary fissures running out of the calcarine, or even a definite retro-calcarine, or collateral, besides other associated sulci are found varying in size.

The *Ungulata* are large animals, and they need a large brain surface and many convolutions, but the mesial area is very simple, not dissimilar to that of the Ant-eater.

There is no high specialisation in the calcarine fissure, it is large and placed behind the splenium. It joins the intercalary, and that the genual, showing a complex splenial.

The eyes are usually placed on the side of the head, and separated by the forehead or nose, there is a wide area of *periscopic sight*, but they have only a limited amount of convergence and binocular vision. The Deer are particularly helped by a high degree of smell and hearing. In the Horse about one-sixth of the fibres do not decussate in the chiasma but pass direct.

In *periscopic vision* each eye is responsible for the field on its own side, and as this is represented on the opposite side of the brain, *all* the optic nerve fibres must decussate. When the eyes tend to converge and give slight binocular vision a part of the nasal side of each field is overlapped, the superimposed parts have crossed to the opposite side of the middle line. The extreme nasal field of the right eye is now concerned with the left field of vision, and the fibres that represent this must go to the opposite side of the brain; thus we have some fibres of the extreme temporal side of the retina of the right eye passing direct to the right side of the brain. As the eyes turn more forward, more and more of the nasal fields overlap, and more and more direct fibres are

required. As binocular vision becomes more perfect the lateral range of sight is lessened. In perfect stereoscopic vision both visual axes must be turned towards the object looked at. The whole of each nasal field is carried across the middle line, and is superimposed upon the temporal field of the opposite side. We thus have an almost complete overlapping, only the extreme temporal areas remaining single. But far more important is the overlapping of the maculæ.

The acuity of the macula depends on the delicate association of each cone (7,000 or 8,000 in number) with bipolar nerves and ganglion relay centres. Both halves of each macular bundle of nerve fibres probably pass along the decussating and direct portion of both optic tracts, and are probably distributed widely over the visual cortex of both cerebral hemispheres. The macular area in the cortex is probably widely distributed, or if it is localised, it is especially well supplied with blood with a free anastomosis, thus giving it great resisting and recuperative power.

Lindsay Johnson says that a true macula is only found in men and the monkeys, and they alone probably possess parallel vision with complete convergence.

In the Monkeys the calcarine sulcus becomes the centre of further developments, it is quite separated from the

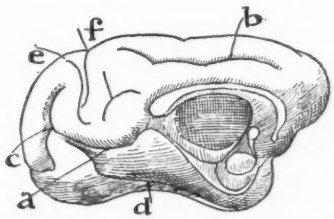

FIG. 18.—MEDIAN SURFACE OF BRAIN.

a—Calcarine Fissure. *b*—Intercalary. *c*—Retro-calcarine.
d—Collateral. *e*—Parieto-occipital. *f*—Intraparietal.

intercalary, which with the rostral becomes the callosomarginal. In the Aye-Aye and Lemurs it is somewhat vertical, but in the Tamarin, one of the anthropoid apes, and Marmoset a long single sulcus is prolonged horizontally far back into an elongated occipital lobe which measures nearly half of the brain.

In the Squirrel Monkeys (Cebidæ) almost half the hemisphere lies behind the splenium. The calcarine sulcus terminates in a wide-shaped bifurcation, and several other compensatory calcarine sulci are developed. The collateral runs forward on its ventral side, and from its dorsal runs up a parieto-occipital sulcus close to but behind the intraparietal. The intraparietal in man is the only sulcus of the parietal lobe, it lies behind the central sulcus, and has the following divisions: (*a*) post-central superior, and (*b*) inferior, (*c*) horizontal, (*d*) occipital.

The frontal lobe is separated from the parietal by the fissure of Rolando.

In the Macacus we have the higher organisation of the old world Monkeys (Cercopithecidæ). The smell organs are well seen, but diminishing. The long bifid retrocalcarine, the collosal and the parieto-occipital, with the intraparietal sulcus, are well developed. This brain shows the same sulci as Fig. 226, and also the usual human structures—corpus collosum, fornix, anterior commissure, etc.

The axis processes from the optic tracts and lateral geniculate bodies traverse the posterior end of the internal capsule at the junction of its superior and inferior laminæ behind the lenticular body, and then pass directly backward as the *optic radiations* towards the occipital lobe. They run along the outer wall, roof and floor of the posterior horn of the lateral ventricle, and end in the nervous felt work of the occipital cortex along the calcarine fissure.

The occipito-thalamic radiations consist chiefly of "corticipital fibres" for sight, but corticifugal fibres also

pass along them to the superior brachium and quadrigeminal colliculus, and thence to the oculo motor nerves.

The visual path has its anterior neurons running from the retinal elements to arborize in the cells of the external geniculate bodies, and from them the posterior neurons run on to nerve cells in the occipital cortex in and around the calcarine fissure. It is therefore not the retinal fibres, but the fibres of the external geniculate body that are projected upon the occipital lobe.

THE VISUAL CORTEX IN MAN.

The *calcarine fissure*, which in man commences a short distance behind and below the splenium, was first well described by Cunningham.

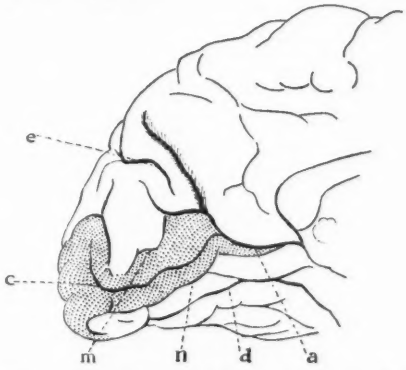

FIG. 19.*—MEDIAN SURFACE OF BRAIN—MAN.

a—Calcarine Fissure. *c*—Retro-calcarine. *d*—Collateral. *e*—Parieto-occipital. *m*—Sulcus Limitans, superior. *n*—Sulcus Limitans, inferior.

It consists of an anterior part, or "stem," the "true calcarine fissure," which protrudes into the posterior horn of the lateral ventricle as the "calcar avis."

* Fig. 19. Specially drawn from a brain in Royal College of Surgeons' Museum, and kindly approved by Professors Keith and Elliot Smith, to whose work I am further indebted in this paper.

Other diagrams are copied or modified from the *Catalogue* (*Physiology*) *of the Royal College of Surgeons' Museum*, from Balfour's *Comparative Embryology*, and from Wiedersheim's *Comparative Anatomy*, and I beg to express my obligations.

The fissure as it passes backwards appears to bifurcate into the posterior or retro-calcarine, and the occipito-parietal fissures. Really, however, the latter is separated from it by the *annectant cuneal gyrus*, and the former by the *deep anterior annectant cuneo-lingual gyrus*.

The *posterior calcarine* itself also seems to bifurcate behind into an upper and lower vertical fissure, the "fissura extrema" or "terminalis," but it is really separated from them by the posterior annectant cuneo-lingual gyrus.

If sections are made through the cortex of the occipital lobe, there is seen running across the calcarine fissures and parallel to the grey matter which covers the surface of the lobe a well-marked, easily-seen white line. This is continuous with and is, as it were, an exaggeration of the line of Baillarger, which can be seen in many parts of the grey matter of the brain, especially in the superior parietal lobule.

In the occipital lobe the white lamina is especially easily seen on section, and is known as the line of Gennari. The line is due to the presence of a special plexus of nerve fibres, mostly delicate, but many of stronger calibre, and some very stout fibres running in the cortex and traceable for a considerable distance; within its deeper surface are the endings of the optic radiations.

Elliot-Smith has most carefully described its distributions. It stops abruptly, and can be readily traced, and the area over which it passes can be easily identified. It runs in the grey substance of the occipital lobe following the sulci and convolutions, and by means of its presence the area concerned in vision can be accurately mapped out. Though it appears as a line in sections of the brain, it is really, of course, a layer of special tissue, which forms part of the thickness of the cerebral grey matter, and lies halfway between the surface and the underlying white matter of the brain.

At the retro-calcarine fissure it is seen to line the hollow and both sides of the sulcus, and it reaches *upward* on the cuneal gyrus, and *downward* on the lingual gyrus, as far as the two small sulci, which run nearly parallel to the retro-calcarine, namely the "sulcus limitans superior" *above*, and the "sulcus limitans inferior" *below;* these meet together in the pole of the occipital lobe, and bound the area striata at that part. It is only prolonged a little to the posterior lateral surface of the hemisphere around the tip of the occipital lobe. Here it is strictly bounded by the sulcus lunatus, which is itself free of the striate tissue.

The area of cortex which it involves is called by Elliot-Smith the "area striata." This is the "visuo-sensory area" of Bolton, Campbell and others, the "primordial visual area" of Fleshing.

The Visuo-sensory Area.—The structures concerned have been most carefully examined by Campbell, who finds that the special lamination included in the line of Gennari shows its largest dimensions at the forked termination of the posterior calcarine fissure which it surrounds, and just reaches the pole of the occipital lobe; and as the length of one or other limb of the fork may be greater or less, the extent of the striate tissue will also increase or diminish, not only in length but in breadth and substance.

It spreads forward, bounding the retro-calcarine above and below, involving the cuneo-lingual gyri at either end of that fissure. It spreads definitely below, occupying the lingual gyrus, and passes forward half-way along the lower border of the true calcarine fissure. Above it is well marked at the back of the cuneus; but anteriorly, at the angle where the occipito-parietal sulcus leaves the calcarine, it has gradually ceased to exist, and it is not found in the cuneal portion of the annectant gyrus at that part.

The occipito-parietal sulcus is quite free of it, so is the

gyrus fornicatus. There is no striate tissue along the upper margin of the calcarine proper. Both Campbell and Elliot-Smith insist that it is only found along the lower margin. On the other hand, the retrocalcarine is extensively and completely surrounded by the stria Gennari both in man and the anthropoid apes, Elliot-Smith proposes to call it the " medial intra-striate sulcus."

Microscopic examination shows that the line of Gennari is composed of a dense network of fibres, in which terminate the fibres of the optic radiation in a pale-stained area. The cells that are distinctive of this region are curious large triangular or quadrilateral-shaped stellate cells, found chiefly along the calcarine fissure, and in the deeper parts is a layer of pyramidal giant cells, the solitary cells of Meynert.

Visuo-psychic Area.—Outside the visuo-sensory area is a border about two centimetres in width, the *visuo-psychic area*. It covers the cuneus above, but not the occipito-parietal fissure, nor the upper edge of the true calcarine, but it occupies its lower border almost in its whole length. It passes over the back part of the collateral fissure and round the occipital lobe, rejoining the cuneus above.

The gyrus fornicatus does not seem to be a part of the substratum of vision.

The *visuo-psychic* region has no line of Gennari, but there are a very great number both of cells and of fine fibres showing a high degree of functional activity. The peculiar stellate cells have disappeared, and there are no large cells of Meynert; but on the other hand there are many large pyramids, some of which are developed into giant cells, characteristic of this layer, with several roots below, and one very long-drawn-out process above.

This area probably transfers impulses received from the " visuo-sensory " to further districts in the brain associated with the sense of sight.

Dr. Mott, in his interesting Bowman Lecture on the progressive development of the visual cortex, shows how the width and complication in structure of the cortex gradually increases as we ascend the animal series, and how the special cells become more necessary.

Thus in the *Hedgehog*, in addition to polymorph and small stellate cells, are found occasional large pyramids. In the *Rabbit* there is a line of Gennari, large stellate cells and branching pyramids.

Ungulates have a well-marked line of Gennari, and numerous solitary cells of Meynert. In the *Cat* there are numerous cells of Meynert, but the most striking feature is the depth of the pyramidal layer; these pyramids are also well developed in the cervical region of the cord, and Mott suggests they lie along the volitional path of the executive faculty, which is exercised through the fore limb and with the help of binocular vision.

The depth of the pyramidal layer increases after birth. Dr. Mott considers that the progressive development of the pyramidal layer in the visual cortex of Mammals is associated with an increase in the perfection of binocular vision.

Flesching has shown, by preparations of the fœtal brain, how the development of different parts of the visual areas takes place.

He considers that as there are many degrees of functions, so the nerve fibres develop as they are required—the *sensory* found at birth, the *motor* found soon after birth, and the *associated* which gradually develop.

Thus at birth only a portion of the fibres in the optic-thalamic radiations have acquired their *myelin investment*. All those that have done so come from the lateral geniculate bodies, and they go direct to the calcarine fissure. Those fibres that come from the pulvinar appear to be medullated

later in life, and to pass outside the immediate limits of the calcarine area.

Medullation of the fibres in the cortical areas occurs at different times. Thus an infant very soon sees light, but does not show that it sees an object held in front of it for some weeks, while it takes him as many months to turn his eyes to follow an object held at his side, or to stretch out his hand to get it.

It is obvious that the highly co-ordinated work that depends on sight is constantly needing the development of new cells and of association fibres throughout life, and they are far more easily acquired in early life.

Visuo-sensory Association Fibres.—The visuo-sensory area along the calcarine fissure is the primary station in each hemisphere for the reception of impressions coming from the retina through the geniculate bodies; around it is the visuo-psychicarea to which these impressions are transferred; this occupies the rest of the surface of the occipital lobe, its functions are to elaborate and to interpret. If part of the visuo-psychic area is primarily diseased, there is likely to be a partial hemianopsia complicated by slight peculiarities of vision more or less indefinite, some difficulty in memory of words, some form of letter, word or mind blindness.

When the fibres that go to the temporal region are affected there may be word deafness, or loss of power of the musical faculty, to recall names, or to read aloud.

The psychic cells are associated with the "psychic motor," where the impressions or information gained by sight are transferred for purposes of thought, speech or action, and these with the "emisive motor" by which speech and writing are effected; the centres for these latter acts lie adjoining those for the simple movement of the lips and hand.

The various parts of the visual cortex are closely

connected by short association fibres almost infinite in their distributions, and more distantly by long association fibres, many of which are collected in well-defined bundles.

Adjoining the occipital lobe, and continuous with its lateral gyrus, is the angular gyrus, which appears to be a higher visual centre of some importance, probably developed mainly on the left hemisphere.

The angular gyrus might be readily associated with the primary visual area by means of fibres running through the occipital lobe, or with the psychic area, or with the pulvinar or elsewhere by association fibres.

The central sulcus of each hemisphere separates the motor area (frontal) in front from the sensory area (parietal) behind. The interparietal sulcus runs upward almost parallel behind the central; it then turns horizontally backwards parallel to the upper margin of the hemisphere and terminates in the occipital lobe behind.

It separates the post-central region of common sensation (and the superior parietal occipital gyri) from the supra-marginal and angular gyri. These two latter are probably the centres for the recognition of higher, more elaborate forms of sensation and of sight and hearing.

The pupil reflex passes through the lower centres, corpora quadrigemina and third nerve, it is quite unconscious, and does not reach the cortex of the brain.

But pupil movements are also controlled by impulses centrifugal from the visual cortex through the brachium superius and the quadrigemina.

Many of the simpler and most constant movements that occur in association with sight are automatic, practically reflex, in such involuntary movements as looking towards a sudden light or to moving objects. Wide movements of the head and limbs are constantly necessary in avoidance of obstacles, and express visual reflexes of varying

complexity. For them associated fibres run from the visual cortex to the motor centres from which the movements emanate: some of these tracts are in such constant co-operation that the associated movements become a kind of compound reflex action gradually evolved by constant use.

Eye movements intimately associated with the most complex mental activities are most of them involuntary and unconscious; consciousness is alone concerned with the result effected.

The visual centres are undoubtedly reached by other afferent impulses than through the eyeball and retina alone. Muscle sense produced by pupil action and accommodation, and movements of the eyes in any direction, or in convergence, cause simple impulses towards the brain. Visual judgments also largely depend on impressions from the sense of touch, and as almost every movement of the body is guided by sight, the associations around sight are very wide indeed.

When the sight is lost from defects in the *eyeball or optic nerve* almost all other impulses from hearing, touch, muscle balance, etc., are effectual in stimulating a healthy visual cortex, and they become increased in influence to the help of faulty sight. But *defect in the visual brain* is a much more serious matter, and if the sensory area is damaged by disease some part of the psychic area is likely to be affected with it.

GUNSHOT INJURIES TO THE EYES.[1]

BY

E. H. E. STACK, M.B., F.R.C.S.,

Capt., R.A.M.C.(T.F.); Specialist in Ophthalmology to the 2nd Southern General Hospital.

EYE INJURIES AT THE 2ND SOUTHERN GENERAL HOSPITAL.

WE have to deal at this hospital with over one hundred cases a month of trouble of some sort connected with the eyes.

[1] Read before the Medico-Chirurgical Society, December 15th.

About one-third of these are due to injury or disease. An injury may affect the eye directly, or be the result of some cerebral trouble at a distance.

We have seldom had to trephine for injuries to the inner table, because experience has shown the necessity of doing this operation as soon as possible after the injury has been received, and there are therefore great numbers done in France on the first possible opportunity.

In cases of injury to the vault which have not been trephined, or in which, in spite of trephining, cerebral symptoms persist, then an œdema of the disc, which is very often present, is a marked extra indication for exploring. If in addition there is any contraction of the field of vision the indication is all the stronger, but when there is hernia cerebri or other signs of local sepsis, then it is just as well not to be in too great a hurry.

A man of 26 had a glancing wound of the right parietal bone with local suppuration and some necrosis of the outer table. For some weeks he was lethargic, slightly feverish, and had persistent œdema of both discs. On several occasions Colonel Michell Clarke suggested exploration, but I was loth to do this on account of the local infection. When the piece of bone exfoliated he improved, and was soon able to get about, but he had persisting tendency to slight giddiness. I don't know now whether I should have trephined or not.

From a scientific point of view it is a great pity that our patients have to be moved on so fast. The greater number of them one only sees a few times, and then they go, to be heard of no more; consequently one has but little opportunity of getting an idea of prognosis.

I. SHELL SHOCK.

This is the most interesting eye problem which has arisen in the war, and the pathology is very difficult.

Several men at first sight seemed to be suffering from this condition, but when they came to be tested they got normal

or nearly normal vision with glasses, usually hypermetropic astigmatism. Some were old blind eyes discovered for the first time, and possibly one or two were malingerers, although I never was able to prove this.

Then again men who had lost the sight of both eyes were usually sent to other hospitals, as we have had, as far as I know, only two cases of men blind in both eyes from any cause.

Many cases of blindness from "shell shock" get well rapidly. Putting all these facts together, it is not to be wondered at that we have had but few to illustrate this type of injury.

Private S. received no wound; a shell burst close in front of him, and he fell down. He noticed that at first he saw very badly, but soon recovered sufficiently to see pretty well with the left eye.

On admission all details normal except some photophobia in a bright light, and a little lachrymation in both eyes, no scotoma or Berlin dimness, the fundus being quite natural, and there was no error of refraction.

The vision in the right eye was $\frac{6}{60}$ and in the left $\frac{6}{5}$. Vision a week later in the right eye was much better, I think about $\frac{6}{12}$, but unfortunately I have omitted to note it. He showed no other signs of neurosis, and was quite sure that previously his vision in both eyes was good; he had always used his right eye for shooting.

Another case was complicated by having had epilepsy at rare intervals all his life. He was in a highly neurotic state, and when I first examined him he could only count fingers. However, a few minutes later he was persuaded to read $\frac{6}{5}$ with each eye, having two glasses in the frame, one being a $+1$ and the other a -1, which of course exactly neutralised each other.

I am very sceptical whether there is anything out of the ordinary in the cases who have developed defective vision after shell explosions. Either they are struck on the head without knowing it, or else they become for the time being subjects of hysteria or some other mental condition.

Nystagmus.—Quite a number of men have returned from the front suffering from this condition, which was not present before they went out.

I have seen about six of these. They are all of the same type, a coarse lateral nystagmus, rather worse when trying to fix an object, but very nearly constant. They are not made worse by looking up, as in miners. They show no evidence of intracranial pressure or of cerebellar disease. They are mostly of a neurotic type, and vision is a good deal interfered with.

For instance, a man whom I saw this morning, who up to the time he joined the army had been earning thirty-five shillings a week driving a tram. In France he fell on the top of his head and was stunned and cut slightly, but his wound was trifling. I saw him first nine months ago, and his condition is just the same now.

Coarse constant lateral nystagmus, fundus natural and vision *R.* and *L.* $\frac{6}{24}$, not improved by glasses.

This must be a purely cerebral condition, and I should think due to an actual lesion.

II. BLOWS ON THE EYES, INCLUDING BLOWS ON BONES IN THE NEIGHBOURHOOD, WHICH EXHIBIT NO SIGNS.

There is a history of the blow, and there is defective vision. These may be divided into two categories.

1. *Those which have an error of refraction.*—There have been quite a number of these, almost all hypermetropes.

Private E., aged 25, struck by head of a nail on the right eye, One week later tension −1, vision *R.* $\frac{6}{60}$. Fundus normal. Twelve days later vision

$$R.\ \frac{6}{36},\ \text{c.} + 2.5 = \frac{5}{5},\ L.\ \frac{5}{5},\ \text{c.} + 1.5 = \frac{5}{5}.$$

There have been many cases of this sort where, although no previous symptoms of eye-strain have been known, the blow has been the cause of sufficient interference with accommodation to bring out the latent hypermetropia. I expect that this paresis is only temporary.

2. *Those with no error of refraction.*

Private L., 4th Suffolks. Left eye bruised by a bullet. Ten days later vision $\frac{6}{36}$, no hypermetropia. He improved a good deal before discharge.

There have been several other cases identical with this one, and two at least recovered perfect vision.

III. BLOWS ON THE EYE GIVING RISE TO PHYSICAL SIGNS.

1. *Photophobia and lachrymation.*—These have been very common, and often persist for much longer than one would expect, seeing that no obvious damage has been done.

2. *Subconjunctival hemorrhages* have often been noted, vision is generally much interfered with at first, there is but little conjunctivitis.

Private H., R.F.A., G.S.W. Two weeks ago sclerotic bruise. Vision, fingers at four yards, faint haze in the macular region, no definite scotoma could be made out.

Three weeks later vision $\frac{6}{36}$. The prognosis in this class is poor. Those who get well improve much more rapidly than this.

Private T., 2nd Essex. Struck ten days ago by a comrade's bayonet. Sclerotic hemorrhage in the right eye. Vision $\frac{1}{60}$. Twelve days later vision $\frac{6}{18}$. Fundus normal.

3. *Keratitis.*—Most of these are due to splashing of mud as the result of shell explosions, and there is nothing peculiar about them except, perhaps, that they take longer to get well than one would expect.

4. *Damaged iris and hyphæma.*—There have only been three or four of these.

Sergeant W., G.S.W. Torn and tucked-up iris, slight diplopia, and perception of light only; some vitreous hemorrhage with a red reflex; vision later $\frac{6}{60}$ c. -2, spherical, and a cyl $\frac{6}{9}$. Fundus seen a little foggy and disc natural.

5. *Traumatic cataract.*—There have been a good many of these, most of whom moved on before the question of operation arose, while the others, for some reason or other, were advised to postpone operation to a later date.

It is not a settled point when a traumatic cataract should be removed ; some advise early excision instead of needling, claiming less liability to irremovable bits of capsule, while on the other hand some lenses become fluid, and can be almost completely evacuated through a small incision.

6. *Vitreous opacities.*—The prognosis is much worse as regards return of vision, but occasionally there is a much better result than one would expect.

Sergeant G., aged 29, was struck in the right eye by a piece of shrapnel. He did not notice anything for five weeks, and then muscæ appeared. On admission vision *R.* $\frac{6}{5}$ c. + .75 $\frac{6}{5}$. Retinoscopy in each eye showed between 4 and 5 D. of hyper metropia.

Ophthalmoscopic examination revealed extensive fine vitreous opacities without any change in the retina.

So that he had perfect vision in spite of a blow which caused hemorrhage into the vitreous.

Private G. had a rifle wound which fractured his right malar bone.

There was no red reflex obtainable except an occasionally-seen small red spot like a hole in a black curtain ; with oblique illumination dark masses of clot could be seen moving behind the lens, which had not been damaged. I rather suspect a spicule of bone perforated the globe in this case, as the tension was low.

7. *Changes at the macula.*—Haab considers the macula as the most vulnerable point of the fundus.

Commotio retinæ is a term which should be confined to cases in which after a blow in the neighbourhood or on the globe there is œdema of the retina near the spot hit, or at the macula or at both.

This œdema is said to be due to vascular changes following

the anæmia caused by the blow, though it is difficult to see how such a transient anæmia could give this effect.

This œdema at the macula may pass off in four or five days. Collected cases show that permanent central defective vision results in about a third of the cases.

Rarely retinitis proliferans follows, showing that at least in some there is retinal hemorrhage.

I have had only two cases showing this macular œdema. The first I have already mentioned under the head of sub-conjunctival hemorrhage. In it there was a faint whitish haze round a red macula and two or three radial striæ passing from this downwards, but even when his vision had improved to $\frac{6}{36}$ I could find no evidence of a central scotoma.

R., aged 25, 2nd Grenadier Guards, had been the crack shot of his regiment, using his right eye.

Ten days previous to admission a rifle bullet had turned up a flap of skin on the right eyebrow. He was not unconscious at the time, and when I saw him his vision in the right eye was reduced to perception of light. The disc was very white, but the arteries were not small; there was well-marked faint whitish œdema round the macula. He was in for several weeks without showing any improvement in his vision.

There have been no cases showing the so-called "hole in the macula."

8. *Ruptured choroid.*—I have seen only one of these, and it had two peculiarities. The man said he had not been struck, but that a shell had burst close in front of him. The rupture had the typical vertical crescentic appearance, but was situated to the temporal side of the macula, which was normal, instead of the usual situation between it and the disc. His vision was p. l. only.

9. *Foreign bodies in the eye.*—One situated in the lens was infected on admission, and the eye had to be removed.

Another was a small piece of shrapnel buried very deep

in the cornea, where it had been for six weeks without giving much trouble, and scarcely interfering with vision.

With Mr. Richardson Cross's kind assistance I removed it with Haab's giant magnet at the Eye Hospital.

10. *Foreign bodies in the orbit.*—In one case I removed a piece of shell from the frontal sinus and left a larger bit in the sphenoidal sinus. He had some œdema of his disc, and very good vision. He went out healed without any symptoms.

11. *Ruptured globes* had almost all been enucleated before admission.

12. *Papillœdma.*—There have, of course, been numerous cases in this category, but I do not intend going through them, as they are better dealt with by the neurologist. One point noticeable about them is that many have, in addition to the swelling of the papilla, a ring of œdema in the retina surrounding the disc, the swelling is not often more than 2 D., and I have seen no case with retinal hemorrhages.

13. *Optic atrophy.*—There have been four of these. One certainly was due to damage or rupture of the optic nerve behind the eye.

14. There have been three cases of quadrantic scotoma due to wounds in the occipital region.

IV. LACHRYMAL OBSTRUCTION.

Most of these are not due to injury, and occurred in troops in our neighbourhood who had not seen active service, but I should like to emphasise the good and rapid results I obtained by doing West's intranasal operation on the sac.

There is one man in the 2nd Southern General Hospital now who was under my care at Southmead last year. He came in with the first batch of wounded which we had.

A bullet had crossed his nose. The external wounds healed rapidly, and he was sent on Home Service duty.

He has had some necrosis of the ethmoid with the inferior turbinated bone adherent to the septum, and complete blockage of the tear duct. He will require an excision of the sac or a West's operation, if the nasal condition permits.

Plastic surgery of the lids has been frequently performed, but claims no special mention.

One man with a cut lower lid seemed much amused because a bullet had smashed his eye, which happened to be a glass one.

The three things which have struck me most with regard to these eye injuries have been, firstly, the number of glancing wounds of the eyeball, which, while causing considerable damage to the eye, have left untouched the surrounding soft parts; secondly, the frequency with which blows have brought to light for the first time quite marked degrees of hypermetropia; and, thirdly, the number of men who have acquired nystagmus as the result of head injuries.

Progress of the Medical Sciences.

SURGERY.

Sepsis and Antisepsis in Wounds.—As was only to be expected, one object of medical research during the war has been to ascertain the nature of infection that may follow a gunshot injury, and the best means of prevention and treatment. Such studies will have a permanent value in civil surgery also, because the essential features of gunshot wounds, namely a long narrow track infected by earth or fragments of clothing, and containing lodged foreign bodies or pieces of splintered bone, may be reproduced by the injuries of peace as well as of war.

Nature of the Infection.—Fleming[1] examined bacteriologically a large number of wounds at a base hospital at

[1] *Lancet*, 1915, ii. 638.

Boulogne. He found that the micro-organisms present were by no means the same as those found in wounds caused by, shall we say, industrial accidents in England, which are not infected either by earth or clothing.

Early, one to seven days, Fleming found *Bacillus aerogenes capsulatus*, 90 per cent.; *streptococci*, 90 per cent.; *staphylococci*, 30 per cent.; *bacillus tetani*, 15 per cent.; coliform bacteria, B. *x* and *y*, and other indeterminate organisms, occasionally. Later the bacilli die out, and the wounds contain principally streptococci.

All these bacilli are probably of fæcal origin, either human or animal. According to Sir Almroth Wright, the streptococcus is also fæcal, the *enterococcus* of French bacteriologists. Needless to say, it does not follow that a patient with *B. aerogenes capsulatus* in the wound necessarily develops gas gangrene; a main determining factor in bringing about that complication appears to be lack of drainage. Nor does infection with *B. tetani* necessarily produce lock-jaw. Up to December last about 1 in 200 of the wounds led to tetanus, but now that antitoxin is so frequently given as a prophylactic the disease has become quite uncommon. Last February the proportion developing gas gangrene was put at 2 to 3 per cent. (Sir W. Watson Cheyne).

Antiseptic Treatment of Wounds.—A number of interesting researches have been published as to the relative value of various antiseptic and other applications.

Delorme,[1] speaking for the French school of military surgery, advocates as a first application, immediately after infliction of the wound, either a single brush of tincture of iodine, or a dry sterile gauze dressing, not to be handled directly by the wounded man or attendant. Afterwards hydrogen peroxide is to be the main stand-by in the treatment of all infected wounds.

Sir Watson Cheyne,[2] with Fleet-Surgeon Bassett Smith and Mr. Edmunds, acting as a Naval Committee, have studied the penetrative power of various antiseptics through gelatinous media, such as agar and blood-clot. The method was to put an antiseptic paste at the bottom of a Petri dish, pour in agar a quarter inch thick, sow it with staphylococci or various sporing organisms, incubate, and observe whether the antiseptic under the agar sufficed to check growth on the surface. They found that iodine was quite ineffective; the best penetrating antiseptics were carbolic acid and the cresols (liq. cresol saponatus, lysol, etc.). They therefore advise a paste of 20 per cent. carbolic acid in lanoline (six parts) and white wax (one part), to be applied to the wound as soon as possible after infliction.

[1] Delorme, *War Surgery*. [2] *Lancet*, 1915, i. 419.

The paste is, of course, more lasting than a lotion, and it is not irritating. A few cases are recorded in which it seemed to do well.

In a later communication they report that a mixture of salicylic and boric acids injected into guinea-pigs along with a highly infected earth containing bacilli of tetanus and gas gangrene quite prevented those diseases.

Sir Watson Cheyne reminds us that the introduction by Lister of crude phenol, as an application for dirty wounds, went far towards abolishing tetanus, which had previously been common in his wards.

Mr. Bond [1] has dealt experimentally with the objection that strong antiseptics delay healing. He has systematically painted wounds in the course of operation for hernia, varicose veins, etc., with pure carbolic, tincture of iodine, 1 in 20 carbolic, or 1 in 1,000 mercuric perchloride, and found that there was no difference in the appearance and rate of healing as compared with a wound in which no antiseptics were used. One may comment, however, that these wounds are much smaller than many of those inflicted in war.

Mr. K. Taylor [2] publishes some experiments with quinine in the prevention of gas gangrene in guinea-pigs. It is far more powerful against *B. aerogenes capsulatus* than carbolic acid *in vitro*, and whereas apart from its use all the animals inoculated died of gas gangrene, with it 59 per cent. recovered. He suggests a 1 per cent. solution, which is non-toxic.

What promises to be a very valuable new antiseptic has been described almost simultaneously by several workers; in England by Professor Lorrain Smith [3] and coadjutors. This is hypochlorous acid, obtained by mixing boric acid and bleaching powder. It may be used in powder form, called "eupad," or as a solution (25 grm. to the litre). called "eusol." It must be used fresh. Its great virtues are that it is cheap, non-toxic, not usually irritating, and far more effectual than 1 in 20 carbolic; it rapidly kills spores of tetanus and other organisms. I have found eusol very valuable in a few cases of recent dirty wounds. Surgeon H. E. R. Edwards [4] reports very favourably on its use in the Navy on H.M.S. *Lion*.

Sir Almroth Wright [5] teaches that antiseptics are of little or no value in the treatment of infected wounds. They do not penetrate into pus, clot or living tissue to any useful extent, and only kill the germs in the free discharge which is going down the drain anyhow. Possibly an exception must be made in favour

[1] *Brit. M. J.*, 1915, i. 405. [2] *Lancet*, 1915, ii. 538.
[3] *Brit. M. J.*, 1915, July 24th.
[4] *Journ. Royal Naval Med. Service*, 1915, October.
[5] *Brit. M. J.*, 1915, ii. 629, 670, 717.

of such drugs as salvarsan and optoquin, which do not coagulate albumin, and have a special chemical affinity for particular organisms. He advises, (1) in the first-aid station, that bleeding should be stopped, splints applied, the wound cleaned, and a vaccine given (streptococci, staphylococci, B. aerogenes capsulatus). (2) In the field ambulance, extract foreign bodies, and give anti-tetanic serum. Secure efficient drainage, and apply hypertonic saline solution (5 per cent., with 0.5 per cent. of sodium citrate) by wicks of gauze carried down into the wound, and covered with pads soaked in the same, with a tabloid or two of salt in the dressing. Protect the skin with vaseline. (3) At the base hospital, irrigate with hypertonic saline till the wound is healthy, then use normal saline instead. If cellulitis or gas gangrene develop, or pocketing of pus occurs, make incisions, and apply hypertonic saline. If a joint is wounded irrigate with normal saline from the first.

The function of the hypertonic saline is to draw out lymph through the infected area, and so to bring its bactericidal properties into play ; the citrate is to stop clotting. The strong saline, however, kills the leucocytes, therefore when the position is won, but not consolidated, we change over to normal saline to bring up the white blood corpuscles into the scene of action.

A few words may be added by way of summary. Many small wounds will heal by first intention under any sensible line of treatment. The main value of antiseptics is within the first forty-eight hours ; after that it is doubtful if they do much good. Whatever method of treatment is adopted, removal of dirt or clothing, and the provision of free drainage are supremely important. Of antiseptics in the early stage (under forty-eight hours), eusol, the salicyl-boric mixture or quinine are probably best, because these kill spores as well as pyogenic cocci. Later, the competition lies between hypertonic saline and hydrogen peroxide. If gas gangrene threatens, injection of oxygen into the tissues around the wound is valuable.

A. RENDLE SHORT.

Reviews of Books.

Indispensable Orthopædics. By F. CALOT. Translated from the Sixth French Edition by A. H. ROBINSON, M.D., and LOUIS NICOLE. Pp. 1175. London : Baillière, Tindall and Cox. 1914. Price 21s. net.

We think anyone taking up this book may be appalled by its size, and think if all this knowledge is really indispensable then he has not the time to study it. The book embraces

the surgery of the bones and the joints, as the American works on orthopædic surgery do, and as Mr. Tubby's new edition of his orthopædic surgery does. This we regret, as we think orthopædic surgery should be the surgery of deformities only.

There is, however, much of considerable interest in this book of M. Calot's, and large though it is, it does well repay careful reading. Many of the ideas are novel to British surgeons, and demand very careful consideration. The author is, of course, well known in connection with the rapid, forcible correction of the curvature of Pott's disease, which he so strongly advocated some years ago, and was tried by many surgeons in this country, but has now, even by Calot, been abandoned.

But his remarks on the gradual correction of the deformity of Pott's disease are most instructive, and his method of treating the disease well worth careful attention. The form of plaster jacket he applies seems to us by far the best with which we are acquainted, but it is only used in addition to a prolonged period of recumbency, and after it.

The author is very much opposed to operation in spinal abscess, and considers the aspiration method is the only treatment which should be undertaken. The aspiration method seems well worth adoption in some cases, but we doubt if it is as good as the free clearing out of a large psoas abscess, as usually practised by British surgeons.

Operation in the paraplegia of Potts' disease is also strongly condemned. We feel sure it is too often undertaken without a trial of prolonged rest and hyperextension of the spine, but we hardly think it would be right to say it is never indicated. M. Calot seems to have been very successful with hyperextension carried out by his special method, and very rapidly so, in some cases, as though the opening out of the curvature had at once relieved pressure on the cord.

The author's treatment of genu valgum and varum does not seem to us a reasonable one. He bends the limb at the knee-joint, so as to correct the deformity. The manipulation may have to be repeated several times, and the limb is fixed in position for many months. If the genu valgum or varum is due, as it always is, to a deformity in the bones (usually the leg bones) surely a forcible bending of the limb at the knee-joint can only stretch the lateral ligament. But of course it is possible that if the leg is fixed in a plaster case for several months, and all pressure removed from it by preventing the child from walking, the bones may grow straight. We should certainly prefer to treat a case bad enough for this manipulation method, by osteotomy, after the period of softening of the bones was over.

In an appendix to the book a very valuable account is given of the new method of treating scoliosis by the American surgeon

Abbott. He corrects the curvature by his method even in quite bad cases, and they have been followed for several years, and have not been found to relapse. The patient is suspended on a hammock with the spine well flexed, and the curvature is corrected by traction with slings, and then the spine fixed in a plaster jacket. A special frame has been constructed by Abbott for the correction of the curvature.

John Shaw Billings: A Memoir. By FIELDING H. GARRISON, M.D. Pp. ix. 432. New York and London: G. P. Putnam's Sons, The Knickerbocker Press. 1915. Price 10s. 6d.

"Dr. H. sees more sights than I, but I see more men than he." This remark, in one of Dr. Billings' letters to his wife when travelling through Europe studying the planning of the Johns Hopkins Hospital, seems to demonstrate in one sentence the kind of man he was. It offers the readiest explanation why Billings, despite his opportunities for growing "red-tape bound" in the Surgeon-General's Office, despite his life-long training in administration, and his later occupation as Chief Cataloguer to the medical world, nevertheless resisted the tendency to become one of Milton's "ferrets and mousehunts of an index."

Unlike the majority of men whose bent is towards record gathering and arrangement, John Shaw Billings was never obsessed by the beauty of mere orderliness. In his mind indexing, filing and cataloguing were only valuable in so far as they served the needs of men. His libraries, his hospitals and the University which he made and managed were not sights to be seen, they were instruments for men's use. In this respect Billings dominated his contemporaries. Probably no man who, to all intents and purposes, ceased at so early an age from the practice and craft of medicine, has ever exerted a like influence upon its destinies. Here was a man ready all his working days to carry out Trousseau's injunction to his students, "Rich in the possessions bequeathed to you by the physicians of the past, to you belongs the duty of uniting modern science with ancient wisdom, and of rekindling the temporarily despised torch of old medical traditions." Royally did Billings enter into this heritage, and realising its possibilities, administered and enjoyed it to the benefit of his fellow-man and his own great contentment.

Born in Indiana, schooled and taught as a farmer's son, at the age of ten or so his father moved his home to keep a village store as postmaster with a shoemaker's shop. In this environment Billings says of himself, "I was *omnivorous*, read

everything in English as it came, philosophy, theology, natural science, history, travels and fiction ; " also " the Bible through verse by verse, *Robinson Crusoe, Deerslayer, Pathfinder* and *Pilgrim's Progress.*" " I had for my own *Robinson Crusoe, Marco Paul in the Forests of Maine, Harry and Lucy* and *Plutarch's Lives,* and was quite sure I did not want to be a farmer." With his father's encouragement he entered and graduated at Miami University, presently passing on to the Medical College of Ohio. The outbreak of the Civil War took Billings from his Demonstratorship of Anatomy at Ohio to be a military surgeon with the Army of the Potomac. A great part of this memoir is filled with letters from the war, written with a freedom of criticism which we, in this war of ours, read with some amazement, but without any regret that our own correspondents do not write with the same frankness.

It was during the course of the Civil War that Billings was relieved from duty in the field and assigned to the Washington branch of the Medical Director of the Army of the Potomac, to assist in collating the various field reports which went to furnish the Medical and Surgical History of the War. Afterwards he was transferred to the Surgeon-General's Office, and remained there until his retirement from the Army in 1895. Part of the work he did there will remain as a lasting monument in the shape of the *Index-Catalogue of the Surgeon-General's Library at Washington.*

Another outcome of his genius for organisation is the Johns Hopkins Hospital and Medical School. Of less interest perhaps to us, but a no less memorable achievement, was his work in connection with the New York Public Library.

But take him all round, we like best to think of Dr. J. S. Billings as the master-builder, who knew how to find men and secure them for his designs. He was at his greatest in judging material and using it, such material as Professor Welch, Osler, Halsted, Thayer and all that brilliant group who have made Baltimore world-famous ; our own Bristol student, Robert Fletcher, his coadjutor in the *Index-Catalogue* and the *Index Medicus,* and his able successor and biographer, Dr. Fielding H. Garrison.

As a judge of men Billings, aided not a little by medical training, and by physiological and psychological knowledge, towers above most of those statesmen or generals in whom the knowledge of men is commonly believed to reach its highest development. He was undoubtedly a great man, who delighted, unlike many lesser great ones, to surround himself with men of outstanding talents and ability, a true midwife of learning.

Dr. Garrison's biography of his chief does full justice to his memory, and will be read and re-read with increasing interest and satisfaction.

The Practitioner's Encyclopædia of Medical Treatment. Edited by W. LANGDON BROWN, M.D., F.R.C.P., and J. KEOGH MURPHY, M.C., F.R.C.S. With an Introduction by Sir THOMAS CLIFFORD ALLBUTT, K.C.B., M.D., F.R.S. Pp. xxiii. 874. London: Oxford Medical Publications. 1915.

Some ninety-six contributors have produced a compact single volume for the practitioner, up to date, and not of inordinate size or cost, written throughout by men of wide understanding and experience. The work is divided into two parts: (1) Methods of Treatment; (2) Agents in Treatment. Approximately one-third of the latter and two-thirds of the former, with a very voluminous but most useful index of over ninety pages in three columns. Details of surgical operative measures have not been included, although the indications for such measures and the general principles of the treatment of surgical cases could not well be excluded.

On looking through the long list of contributors, we notice the names of Dr. J. M. Fortescue-Brickdale, who writes on Coal-tar Derivatives, the Cinchona Alkaloids, Hypnotic and Narcotic Drugs and the Salicyl and Benzoyl Compounds, also that of Dr. J. A. Nixon, whose articles on Influenza and Pneumonia are quite useful guides, and Dr. A. Rendle Short, who describes the modern treatment of Tetanus.

The book as a whole appears to be a most reliable companion, to be consulted on all occasions when one desires to know the latest accepted views on any point of drug, dietetic, electro-therapeutic, X-ray, climatic, radium, ionic or serum treatment, and the masterly introduction by the Regius Professor of Physic at Cambridge should be read by all therapeutists.

An Index of Treatment. By Various Writers. Edited by ROBERT HUTCHISON, M.D., F.R.C.P., and JAMES SHERREN, F.R.C.S. Seventh Edition. Pp. xvi. 1,143. 1915. Bristol: John Wright & Sons Ltd. [Price 21s.]

The first edition of this work, published in 1907, was intended to provide the practitioner with a complete guide to treatment in moderate compass, and in a form convenient for reference. That it has already reached the seventh edition in eight years shows that the authors have been successful in their endeavours. Several new articles have been added, amongst them being those on Sterility, Radium-therapy, and the Psychoneurosis; seven pages on this last difficult topic give an excellent outline of the methods of treatment employed by Freud and his school.

The book is the combined effort of some ninety authors, who are leading authorities on their respective topics. It is well printed, well bound, has a supplementary index of forty-two closely-printed pages, and cannot fail to be of great service to those who will keep it on the table for ready reference.

Life: A Poem. By BASIL GORDON MORISON, M.D. Pp. xv. 79. London: Baillière, Tindall and Cox. 1915.]Price 3s. 6d. net.]

Dr. Morison, who died on January 28th, 1915, told his wife shortly before his death that "he had written a few verses which he thought might be considered worth publishing;" and some anonymous friend has edited these, with a Preface on "the Physician as Poet," and a biography.

The poem itself, composed in the metre of Gray's "Elegy," has very little that is new in form or thought; but it contains some of the opinions of an earnest man, expressed in carefully-considered, well-chosen words, and there is in it a spirit of pious resignation, hope and courage which might be taken to heart with advantage.

The Preface is well written, and the short biography gives us the picture of an energetic, useful and cultured man following his profession with a determination to do his best.

Some mysterious influence compels many men to try to express their thoughts and feelings in the form of verse. Whether it is wise for one who has no special gift for musical utterance to attempt this, when he could probably do it better in prose,is a question which cannot be discussed here. It may be said, however, that Dr. Morison's lines are as good as much that passes nowadays for poetry.

The Cancer Problem: A Statistical Study. By C. E. GREEN, F.R.S.E. Pp. 98. Edinburgh and London: William Green & Sons. 1914. [Price 5s. net.]

For five years the writer of this book has been collecting "evidence which seemed to bear upon the problem of malignant disease, in the hope that a clue might be got to the cause and possibly the cure of the condition," and the results of this study are here embodied. The extrinsic origin of the disease is alleged to be proved by the facts that cancer is more prevalent in some districts than in others, and common in some trades and uncommon in others, and that the figures bearing on these points are fairly constant. Of possible extrinsic causes the writer argues in favour of the parasitic. Occupational incidence, local incidence and the influence of fuel are statistically considered. Finally reasons are advanced for believing that

calcium preparations are inimical to cancer. We have found the views and arguments submitted to the reader in these pages to be highly interesting and suggestive.

A Nursing Manual for Nurses and Nursing Orderlies. By DUNCAN C. L. FITZWILLIAMS, M.D., Ch.M., F.R.C.S. Pp. vii. 466. London: Oxford Medical Publications. 1914. Price 6s. net.

Of the making of books specially written for nurses there seems no end, and the volume under review is a typical example of its class. The captious critic searches in vain for inaccuracies or omissions, while the style is eminently readable. The arrangement may be described as regional, each system being treated by itself, and a description of the diseases of the system being preceded by an account of its anatomy and physiology. There is much to be said for this arrangement, even if, on casual inspection, it seems to involve rather a mixture of subjects. To give an instance of what is meant, a description of a bed-pan immediately precedes, on the same page, an account of the pathology of infantile paralysis.

To sum up, it may be said that the author has produced a volume which contains an enormous amount of information, written in a style which should make it readily assimilable by the average nurse.

When she knows all the book contains, and how to apply her knowledge, her theoretical training should leave little to be desired. A complete and accurate index is a valuable feature.

Principles of General Physiology. By WM. BAYLISS. Longmans, Green & Co. Price 21s.

This book is somewhat off the usual lines. It is not intended to be a text-book for candidates for examinations, nor does it touch upon the experimental details of physiological research. It rather aims to bring into line the cognate sciences, and to introduce the reader to the relationship between physiological facts and such phenomena as adsorption, enzyme action, osmosis, surface action, the colloidal state, electrolytes, and properties of the cell. There is, however, a chapter on each of the main physiological functions—respiration, reflex action, the eye, hormones, etc. It is not exactly a text-book of comparative physiology, in the sense that it does not devote special attention to the functions of the lower forms of animal life.

The author brings to his task a very wide acquaintance with those parts of physics, biology and chemistry which throw

a light upon physiology. The style, considering the complexity of many of the subjects, is clear. The book is well up to date. and eminently scientific. Amongst the illustrations are photographs of a number of the famous investigators whose researches are incorporated in the text.

Green's Encyclopædia Medica. Second Edition. Vol. II. Aspiration to Chlorodyne. Pp. viii. 677. Edinburgh and London: W. Green and Sons. 1915. Price 20s. net.

Dr. J. M. Ballantyne continues the general editorship of this great work, which is now too well known to need any description or criticism. Amongst the articles revised by their authors we notice that of Dr. P. Watson-Williams on Bronchitis.

The Stretcher Bearer. By GEORGES M. DUPUY. Pp. 138. Illustrated. London: Oxford Medical Publications. 1915.

Published as an addition to the Royal Army Medical Corps Training Book, this little pocket volume will prove of very great value to men who have had little experience of military or ambulance training, to enable them to form a clear idea of a command, as they can see the order actually carried out in the excellent series of illustrations. We consider it will certainly prove of great assistance to stretcher bearers especially.

Diseases of the Throat, Nose and Ear. By WILLIAM H. KELSON. Pp. xv. 270. Illustrated. London: Henry Frowde & Hodder & Stoughton. 1915.

The book has been written for general practitioners and senior students, and "so full details are given of such proceedings as the doctor himself usually undertakes, *i.e.* the removal of cerumen, while brief reference only is made to those which he generally passes on to the specialist." We do not find that these details are sufficiently full, whereas the exceedingly sketchy character of the descriptions of many of the diseases of the regions comprised in the scope of the book are inadequate.

The illustrations are numerous, and many of them excellent.

It must be presumed that the work reflects the present-day teaching of the staff of the London Throat Hospital, Golden Square.

Tropical Diseases. By Sir PATRICK MANSON, G.C.M.G., M.D. Fifth Edition. Pp. xxiv. 937. London: Cassell and Company, Limited. 1914. 12s. 6d. net.—In reviewing a standard text-book of front-rank authority, and now in its fifth edition, it is only necessary to mention the principal new features. These are of great interest. It is now known that Kalaazar is not confined to India, but is found also in North Africa as a children's disease, also occurring in dogs, and probably transmitted by the dog flea. A skin form of infection with the Leishman body is described from South America, called Espundia. The process of development of trypanosomes in *Glossina palpalis* is described, and the moot question of the part played by *Glossina morsitans* discussed. There is a South American trypanosome disease conveyed by a bug in Brazil. It is pointed out that antimony ought to be given as well as atoxyl in cases of trypanosomiasis. Various organisms found in relapsing fever are classified, and the value of salvarsan appreciated. New fevers are described due to the bites of the rat and of a fly called Phlebotomus (the Sand-fly). Very important is the introduction of emetine in the treatment of acute or chronic dysentery instead of ipecacuanha. The relation of beri-beri to cured white rice is set forth, and the great strides which have been made in preventing this disease. Castellani has proved that yaws is due to a spirochæte allied to *S. pallida*, and that it is readily cured by salvarsan. The English type of pellagra is described. In the Fiji Islands it appears that *Filaria nocturna* has become non-periodic because the mosquito carrier is a day-biter. These are only a few of the more important changes. It will be seen that the book has been thoroughly revised and brought right up to date.

Index-Catalogue of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects. Second Series. Vol. XIX. U—Uzzielli. Washington: Government Printing Office. 1914. Pp. 674.—This volume contains 3,046 author titles, 3,736 subject titles of separate books and pamphlets, and 32,739 titles of articles in periodicals. "United States" occupies 70 pages, "Urine" 83 pages, and "Uterus" 292 pages of closely-printed references. The series to date includes over two million references, a statement which shows that the whole profession is under a debt of gratitude for the laborious task of the compilers of a work without which no medical library is complete.

Editorial Notes.

Lord Mayor of Bristol.

To the Lord Mayor of Bristol, Dr. Barclay J. Baron, we offer our congratulations and best wishes for a successful tenure of office. It is many years since the chief magistracy has been held by a medical practitioner in this city, and no one could be better qualified to fulfil its great responsibilities at this time.

* * * * *

Second Southern General Hospital.

In our last issue we published the list of those holding commissions on the *en suite* Staff of this Hospital. Since that time many changes have occurred and newly-commissioned officers have been added to the Staff to take the place of those officers who have accepted appointments in the Expeditionary Forces, viz. Captain Hey Groves, now at Alexandria, Captain Fortescue-Brickdale, at Havre. Captain Carey Coombs is attached to No. 32 General Hospital. The following have been added to the Staff: Captain J. A. Nixon, Captain J. R. Charles, Captain F. R. Walters, Captain Rendle Short, Captain A. L. Flemming, Captain Mackenzie, Captain Irving.

* * * * *

Major P. Watson-Williams (Bristol), Dr. Barclay J. Baron (Bristol) and Major C. S. Ridout (Portsmouth) have been appointed by the War Office as Honorary Consultants for Diseases of the Ear, Nose and Throat to Military Hospitals in the Southern Command.

Miss Baillie, Matron of the Royal Infirmary, and in charge of the Red Cross Nursing Staff of the Second Southern General Hospital, has been awarded the Royal Red Cross in recognition of her successful and untiring labours in organising this important side of the Hospital work. We offer her our cordial congratulations.

* * * * *

The work of the Second Southern General Hospital, under the command of Lieut.-Col. Bush, C.M.G., has been greatly extended by the addition of many beds at the Southmead Hospital and by the conversion of the Fishponds Asylum into the Beaufort War Hospital, under the command of Lieut.-Col. Blachford. It is our intention to give in our next issue further notice of this and other matters, for which it is now impossible to find adequate space.

* * * * *

Temporary Lieut. John Wesley Gilbert, R.A.M.C. (attached 9th Brigade, R.G.A.), who has been awarded the Military Cross for conspicuous gallantry and devotion to duty near Ypres, on December 29th, 1915, is the son of the late Mr. James Cornwall Gilbert and Mrs. Gilbert, of 8 Broadway Road, Bishopston, Bristol. The official record of his action is given in the following words: "After three attempts he succeeded in entering a farm, which was being heavily shelled with gas and other shells, and rendered valuable assistance to the wounded infantry who were billeted there."

Dr. Gilbert, who is twenty-four years of age, carried out his medical studies at Bristol University and the General Hospital. He joined the R.A.M.C. in February, 1915, and for five months was operating in a base hospital at Boulogne, later proceeding to Ypres.

Notes on the Representative Meeting of the British Medical Association.

On July 23rd and 24th a short but important meeting was held. A large part of the Insurance difficulties had been thrashed out at the conference of the Local Medical and Panel Committees, voiced by their deputation to the Commissioners. We need not discuss the excuses made by the latter for the delays which have caused so much irritation. The Council issued a reply to the attack made by the Bristol Insurance Committee on the sixpence now paid to medical men for domiciliary treatment of tuberculosis, about which it should be remembered that the Bristol doctors proposed and actually worked a cheaper and better method of attendance, and the Government offered them this sixpence as a make-weight and part of their bargain for general work. Indeed, much of the tuberculosis work done for it never appears in the returns at all, and but for the panel doctors the earliest cases would often never be discovered.

New rules of procedure in ethical cases have been elaborated under legal advice to safeguard the Association as far as possible. Again and again it has been involved in expensive and dangerous lawsuits through the ill-advised action of local branches, and the safety of its funds has been imperilled by legal defects in the old rules. In future no other rules will be recognised.

It is a matter of congratulation that the Association has been recognised in at least three important directions as a mouthpiece of the profession.

First, the Head of the Army Medical Service applied to it for help in recruiting medical officers. From this sprang the census or register it compiled of men able to offer their services, and in turn it made representations to the War

Office as to the grievances of men who did take up service. A War Emergency Committee was formed to organise the profession, and to deal with matters connected with the war. Sir W. Osler, Sir Clifford Allbutt, Dr. A. E. Shipley, Mr. Verrall and other members of the Association were placed on it, with power to co-opt representatives of the Universities and licensing bodies. They appealed strongly for volunteers.

It appeared that the Bristol and Weston district had already supplied ninety whole-time men for military service, beside those attached to the Base Hospitals of 3,080 beds existing here, and twenty-eight more men were asked for. Great as the strain was, volunteers responded in a surprising manner, and twenty-eight more men left their practices. Of the 275 medical men living in Bristol and Clifton alone, 111, *i.e.* about 45 per cent. of those actually engaged in private practice, have put themselves entirely at the disposal of the State, eighty-four are serving with the colours and twenty-seven at the Base Hospitals. A large part of the remainder are also acting as Civil Surgeons to the troops.

The Appeal of the Bristol Committee to the public not to desert their own medical men after serving in the war was taken up by the Central Committee and issued in substance to the whole kingdom.

In another direction the Association also won recognition. Some of the leaders of the English and Welsh Friendly Societies have at last met us in a harmonious conference on the old and bitterly-fought question of their Medical Institutes. The change from their former determination to crush the Association to the present atmosphere of reasonable discussion is very great. The Representative Meeting in consequence agreed to recognise existing institutions in Wales, under Clause 15 (4) of the Act, which conform to a certain standard. The negotiations are by no means finished,

and we can only say that both sides acknowledge the need of a mutual understanding. The Societies accepted at once some of our positions, and were ready to give up all attempts to make a profit out of the work of the institute doctors, to satisfy us that the funds are not used to lower the price of attendance on dependents, and even on certain conditions to do their best to prevent other institutes or branches of existing ones from being started.

Whether a final agreement is reached or no, we cannot but be thankful that our opponents are getting to understand our point of view, and have shown themselves such able and reasonable men.

Again, the Association has taken action with the Bar Council and the Incorporated Law Society in forming a joint committee to consider important difficulties in the law on insanity. Here, too, agreement was attained with them on old-standing troubles, such as the definition of insanity, the question of uncontrollable impulse, and the position of prisoners found "guilty, but insane." This paves the way for important changes in the law in future. On the other hand, the Representative Meeting made a strong protest, in which they had the support of the Royal College of Physicians, against an attack now being made on professional secrecy. The Association had sent a deputation to the Lord Chief Justice, the Attorney-General, the Public Prosecutor and other officials on May 3rd last. It then appeared that the law officers of the Crown were desirous that medical men should give information to the police when they learn in the course of their attendance upon a patient who is likely to die that an attempt at producing abortion has been made upon her by a third party. This means that they shall disclose without the patient's consent the matter revealed to them, and even go out of their way to publish it.

No indemnity in law is even suggested for a doctor

who thus casts aside his obligation to hold secret what his patient tells him, should the patient recover and bring an action. Nor do the law officials seem to trouble about the lives which would be lost if women were deterred from calling in a doctor by the knowledge that he would inform against them and their accomplices. It is our clear duty to do everything we can as citizens to bring the criminals to book, but we cannot use for that purpose information given us to enable us to save life under the seal of professional secrecy.

As things stand we are already unfairly treated, for the lawyers have complete protection as to statements made to them in their professional capacity by clients, but no such privilege is given to medical men when questioned in court, though it is allowed in the French and other codes.

"Yes," said an old judge to his doctor, "if I had been on the Bench the other day I should have done my best to make you disclose what the patient confessed to you, but," he added, "I should have changed my doctor if you did."

The Notification of Births Act is another instance of the present tendency to force doctors to reveal what they see and hear in their professional work. We may heartily support the Act as a means of obtaining proper care for infants, but it should be compulsory on parents and by-standers, not on doctors and midwives, who come in simply to save life. Otherwise people will do without them and risk the consequences. However, it may be said in defence that the Act does not compel the doctor to do anything at all except to see that someone else—the proper person—does it. The meeting registered its protest against this clause of the Act.

In the Report of the Council among other matters are the very satisfactory recommendations of the *Select Committee on Patent Medicines* appointed by the Government.

The Association has the credit of collecting and submitting much valuable evidence to the Committee.

It recommends that the Local Government Board should have the administration of the law as to secret and patent medicines, keep a register of makers and importers, and institute prosecutions against offenders in a specially constituted court. Another recommendation is that a statement of the exact ingredients of every secret remedy is to be deposited privately with the Board, and the article tested shall be for comparison from time to time. The amount of alcohol contained is to be exhibited on the label of every bottle. No advertisement, or sale for private use, of remedies purporting to cure paralysis, cancer, phthisis, epilepsy and similar diseases, and no advertisements of sexual remedies or of any with the suggestion that they may be used as abortifacients is to be allowed. Various fraudulent practices, such as the use of fictitious testimonials, are also penalised.

The war has failed to stop the flow of schemes for spending the funds of the Association. Though at the meetings of every other society and Local Authority economy is the order of the day, endless proposals for the payment of representatives and for costly new committees were showered upon us. Most of them were promptly defeated, but their proposal at this time shows a strange narrowness of view. Though our finances have temporarily improved, the Association is saddled with a huge debt which it is only now beginning to pay off. The interest on this will be higher in future, and in the hard times after the war our rents may fall, and subscriptions may have to be lowered if the membership is to be kept up. The wages bill has already risen, and if a spirit of vigorous retrenchment does not appear the Association finances may soon be worse than ever.

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Sickness Insurance.

MEMBERS of our profession, more especially, are facing many dangers every day of their lives, and though constant contact with danger produces a feeling of immunity, most doctors nowadays insure themselves against the risk of illness or breakdown as the result of their professional labours.

Medical men are particularly well placed in this respect by having a Society of their own to protect them. Run on the soundest actuarial principles, and on the most economical lines, the Society has attained considerable dimensions. Its income is now over £35,000 per annum, and its invested funds £270,000.

The form of contract is permanent till age 65, and cannot be discontinued before that date, except in the case of fraud, non-payment of premium, or permanent residence abroad. Full Sickness Pay is payable for the first twenty-six weeks' incapacity, and half the full amount for the remainder of the illness. Every kind of sickness and accident is covered, and the premium payable is lower than that of any Company transacting similar business—entirely owing to the fact that no agents are employed and no commission paid. In fact, the management expenses are limited to 10 per cent. of the premium income.

The Committee of Management is composed of medical men, whose services are gratuitous. The members of this Society are therefore assured of more sympathetic treatment than they might obtain from a Board of Directors of a Company with shareholders, who naturally look to the dividends of their concern as an essential factor. All the profits of the Society belong to the members, and some £21,000 has been returned to them in this form.

Members of the medical profession would do well to apply to their own Society for Sickness Insurance rates

before accepting those of other Companies (who charge in some cases at least 25 per cent.) more on account of their heavier management expenses. For all information please apply to Mr. Bertram Sutton, Secretary, Medical Sickness and Accident Society, 300 High Holborn, London, W.C.

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A BI-CENTENARY in any business is an epoch worthy of congratulations, and these we offer to the Plough Court Pharmacy of Allen and Hanbury, which celebrated the event on December 18th last. The business was founded by Silvanus Bevan in 1715, the Allens and Hanburys coming into the firm now known by their names about the middle of the nineteenth century. As about two hundred of those connected with the firm are away serving their country, the foregathering in honour of the event and for the purpose of presentations to members of the directorate, though largely attended, was less complete than it would have been under happier circumstances.

MEETINGS OF SOCIETIES.

Bristol Medico-Chirurgical Society.

Annual Meeting, October 13th, 1915.

After a vote of thanks to the retiring President, Dr. Newnham, had been passed, Dr. George Parker took the chair, and gave an introductory address (see p. 129). Later a cordial vote of thanks was given to Dr. Parker for his able and interesting address.

The Acting Honorary Secretary (Financial), Dr. J. A. Nixon, read the annual report and presented the balance sheet.

The Honorary Librarian, Mr. C. K. Rudge, then read the following report :—

The medical wing of the Blind Asylum having been pulled down preparatory to the building of a New Library, etc., it has again been necessary to find other quarters for the Medical

Library. The Library is now in a suite of five rooms in the old Drill Hall, the entrance to which is from University Road. These rooms are admirably adapted for library purposes, being very well lighted and heated. The Library and Reading Room are lofty and lighted from above, and there is plenty of floor space. It was regrettable to have to report that owing to the unsatisfactory financial state of the Society it has not been possible to purchase any new books during the past year.

The Library of the Bristol Medico-Chirurgical Society now contains 12,961 volumes. During the year 94 volumes had been added. Of this number 75 were sent for review in the Society's *Journal*, and the remainder had come by gift or exchange. The Library is in regular receipt of 163 periodicals, all exchanges. Since last year the purchase of 28 serial publications had been discontinued for lack of funds.

The Bristol Medical Library, to which members have access, now contains 23,702 volumes, and 225 current British and Foreign periodicals. The number of volumes in the various libraries is as follows :—

BOOKS.

Medico-Chirurgical Society	12,961
University Medical Library	8,978
Bristol Royal Infirmary	1,189
Bristol General Hospital	574
Total	23,702

CURRENT PERIODICALS.

Medico-Chirurgical Society	163
University Medical Library	62
Total	225

The following are the elected officers of the Society for the Session 1915–16 : President—G. Parker, M.A., M.D. Cantab. ; President-Elect—F. H. Edgeworth, M.A., M.D. Cantab., D.Sc. Lond. ; Ex-President — W. H. Newnham, M.D. ; Editor of *Journal*—P. Watson-Williams, M.D. ; Hon. Librarian—C. King Rudge ; Editorial Secretary—J. M. Fortescue-Brickdale, M.D. ; Hon. Secretary—A. J. Wright, F.R.C.S. ; Committee—R. Shingleton-Smith, M.D., G. Munro Smith, M.D., I. Walker Hall, M.D., J. Lacy Firth, M.S., F.R.C.S., J. O. Symes, M.D., L. E. V. Every-Clayton, M.D., F.R.C.S., R. G. P. Lansdown.

December 8th, 1915.

Dr. GEORGE PARKER, President, in the Chair.

Capt. CAREY COOMBS read a paper on **Heart Strain** as seen in Military Hospitals. The PRESIDENT and Drs. MICHELL CLARKE and WATSON-WILLIAMS discussed the paper. (See p. 149.)

Lieut.-Col. MICHELL CLARKE read a paper on **Gun-Shot Injuries of Nerves.** The PRESIDENT and Messrs. MOORE and LANSDOWN discussed the paper.

Major LANSDOWN read a paper on **The Localisation of Bullets.** (See p. 157.)

Capt. STACK read a paper on **Gun-Shot Wounds of the Eye** (See p. 198.)

Obituary.

REGINALD EAGER, M.D., M.R.C.S., L.S.A., M.B.

DR. REGINALD EAGER was born at Guildford, Surrey, in April, 1841. His career as a student at Guy's Hospital was a successful one. He took the M.R.C.S. in 1866, L.S.A. in 1867, M.B. (Lond.) in 1868 (taking the Gold Medal in Forensic Medicine and 1st Class Honours in Medicine and Midwifery), and M.D. (Lond.) in 1869. His paper "On Sleep" was awarded the Guy's Hospital Physical Society's Prize as the best paper read before them during that year. Later he was President of this Society. He held the appointments of House Surgeon and Obstetric Resident at Guy's Hospital. After leaving Guy's he was for five years Medical Superintendent of St. Luke's Hospital for Mental Diseases.

In the spring of 1875 he and the late Mr. T. G. Seymour bought Northwoods House, where he resided until he retired in 1913.

In 1910 he first diagnosed symptoms of the malady which was the cause of his health breaking up. For a little over five years he bore his illness with uncomplaining fortitude and courage, doing work and getting about in a way that caused astonishment to those around him.

Dr. Eager was for many years (1879 to 1913) Lecturer on Medical Jurisprudence at the Bristol Medical School. At one time he was a member of the Gloucestershire County Council and Education Committee. He was a member of the Bristol Diocesan Conference, Vice-President for many years of the Bristol District Union of the English Church Union, member of the Bristol Church Day Schools' Association, Churchwarden of Frampton Cotterell Church for twenty-five years, and Chairman and Correspondent of the Church of England Schools. He was a well-known authority on Church matters, and a member of St. Paul's Ecclesiological Society, London.

He had travelled widely, and had visited many places very much out of the ordinary routes. His reminiscences of these trips were interesting and illuminating. He was an artist of no mean order. He was a keen gardener, and during his later

years grew and was much interested in the cultivation of orchids.

In private life he was genial and affectionate, hospitable and liked to have people around him.

CHARLES HENRY FOX, M.D.

THE death of Dr. Charles Henry Fox, which occurred on Christmas Day, 1915, leaves his cousin, Dr. Arthur Fox, of Bath, the only medical representative of a family who have been closely associated with medical work in and around Bristol since the first Dr. Edward Long Fox became Physician to the Bristol Royal Infirmary in 1786. He was born at Brislington House on June 7th, 1837, and was the fourth son of Dr. Francis Ker Fox, of Brislington Asylum, and brother of the late Dr. Edward Long Fox, in whose memory the Long Fox Lecture was founded.

Dr. C. H. Fox was educated at Shrewsbury and Highgate College, and entered as a student at St. George's Hospital in 1855. Having obtained the M.R.C.S., he spent a year at the Edinburgh Medical School, a year which he always loved to look back upon and described as the happiest of his life. He graduated as M.D. of St. Andrews in 1860, and the following year joined his father at Brislington Asylum, of which he became a partner in 1873, and spent the whole of his life there as a medical practitioner, first with his father and latterly with his half-brother, the late Dr. Bonville Bradley Fox.

In 1894, after thirty-three years of practice, he retired and spent the remaining twenty-one years of his life in Edinburgh, to which he was drawn by his many friendships and early associations. In 1900 he was elected a Fellow of the Royal College of Physicians, Edinburgh; he was also a Fellow of the Botanical Society of Edinburgh and of the Antiquarian Society of Scotland. With a keen sense of humour, he was a genial conversationalist.

For some years he was an almost complete invalid, but his courage was great, and despite his afflictions he was ever cheerful, his old friends rallying round him especially during the latter years of his life when his health became impaired.

He leaves behind many relatives to mourn him, and to whom we offer our sincere condolences.

FRANCIS SHINGLETON SMITH, B.A., M.B., B.C. Cantab., Captain, I.M.S.

WE deeply regret to record that Francis Shingleton Smith was reported killed in action on November 22nd, at the age of 36. Educated at Clifton College, he proceeded to King's College, Cambridge, in 1898, and after taking the B.A., continued his

medical training in the Bristol University College and Bristol Royal Infirmary. Shortly after obtaining the degrees of M.B., B.C. Cambridge, he entered the Indian Medical Service in July, 1907.

He did duty in many districts, went with the relief column to Chitral, after which he was laid up at Calcutta with typhoid fever, which he had once before in Clifton. He made a good recovery, was appointed to Captain's rank in July, 1910, and was then transferred to the central provinces. In 1913 he was attached to the 120th Rajputana Infantry. He was home on leave in 1914, but when the war broke out was called back immediately, and received notice to be ready for foreign service.

In due course the regiment found itself at sea, and then bound for the Persian Gulf, where his many letters from Basra and Kurna described the ways of the Arabs of that region, for whom he had nothing good to say. At the battle of Sheiba some months later he was much interested in the excellence and efficiency of the artillery fire of our Indian troops, who cleared out trench after trench of the Turks with great precision.

After this he was sent into hospital at Basra for otorrhœa, apparently contracted by swimming in the Tigris, and at one time by diving for rifles dropped by the troops in swimming some of the creeks of the River Tigris. Then he had an attack of sand-fly fever, which lasted some fourteen days and caused much exhaustion, so much so that he was sent back to Bombay on sick leave. On the way thither he had charge of some of the Turkish prisoners bound for Rangoon: hitherto for him the Arab and Turk spoke no known language, but the doctors among these prisoners were able to speak French, and so he found that the Turkish doctors were good fellows whose companionship was quite agreeable.

On arrival at Bombay he was sent off to recoup at Kasauli, so exchanging the heat of Basra (120° shade) for the cool view of the Himalayan snows. On his return to the Gulf later in September the climate had become tolerable, pleasantly warm by day and a little cold at night. His companions on the transport were 1,200 Punjaubi recruits, who had never seen the sea, and who were overjoyed with the gambols of the porpoises in the Indian Ocean.

We cannot follow him up the river towards Baghdad, but the telegram from the Indian Office, received November 28th, gave his friends the unexpected information that he had been officially reported killed in action. It was reported later that his death took place at the battle of Ctesiphon, November 22nd—24th, and that it was instantaneous. One of his Indian colleagues writes: "You know that if it was to be, it was the

FRANCIS SHINGLETON SMITH, B.A., M.B., B.C. (Cantab.),
Captain, I.M.S.

Some of us will not come back;
But all we ask if that befall,
Is this—Within your hearts be writ,
This single line memorial:—
He did his duty, and his bit.

IAN HAY.

end he would have chosen, to die along with the regiment he had served so well and so long out there. Only the other day I heard how absolutely fearless and indefatigable Frank had shown himself, for I can just see him always busy, always ready to help and always cheery."

His many warm friends will feel that the writer evidently knew Frank Shingleton Smith, and has admirably summed up his main characteristics, for he was altogether unselfish, strong and lovable.

Shingleton Smith had a good knowledge of the numerous varieties of the mosquito as found in India, and regretted that he could not fully investigate the varieties found in the Persian Gulf, but he believed that they all differed somewhat from those found in Egypt and in India, being intermediate between the two.

He was the youngest son of Dr. Shingleton Smith, who till recently edited this *Journal*, and we offer our sincerest sympathies to Dr. and Mrs. Shingleton Smith and other members of his family in their loss.

We hope in our next issue to publish a posthumous paper by Capt. Shingleton Smith dealing with the "Forensic Investigation of Blood-stains."

EDWARD JAMES SHEPPARD, L.R.C.P., L.R.C.S. Ed., AND L.M.

EDWARD JAMES SHEPPARD was born at Warbleton, in Sussex, on July 17th, 1845. His early education was at Wiesbaden and Heidelberg; he then went to King's College, and afterwards to the Agricultural College at Cirencester.

He married, in 1870, Miss S. D. Jones, and took a farm near Kingsteignton, Devonshire.

He entered at the Bristol Medical School when he was over thirty years of age. He then went to Edinburgh and got qualified in 1884.

Besides his work as a general practitioner, he was Public Vaccinator for the Clifton District, and he attended gratuitously, for more than twenty-five years, the inmates of St. Joseph's Home for the aged and infirm poor.

Some years after the death of his first wife he married, in 1904, Miss Mary Mountfort Barnes.

Whilst cycling down Maudlin Street on September 18th of this year he was knocked down by a motor bus, and sustained severe fractures of the arm and pelvis. He was taken to the Bristol Royal Infirmary, where he died from his injuries on September 20th.

Sheppard was a tall, good-looking man, always honourable and reliable, and a well-known and much esteemed practitioner.

Local Medical Notes.

University of Bristol.—Students of the University have recently passed the following examinations :—

UNIVERSITY OF LONDON.—*M.B., Ch.B.—Part II.:* R. B. Britton ; *Anatomy and Physiology:* N. Kemm.

CONJOINT EXAMINING BOARD OF ENGLAND.—*Medicine, Surgery, Midwifery:* V. M. Coates,* C. L. Emmerson,* R. Heaton, B.A.,* H. N. Morgan,* and A. P. Deverell.* *Medicine:* A. W. Adams. *Surgery:* D. M. Smith.

L.D.S., R.C.S. ENG.—W. S. Hazell,* C. Murray Sheriff,* W. H. B. Stride,* R. A. Waters,* A. E. Young,* A. J. Constance.

UNIVERSITY OF BRISTOL.—*M.B., Ch.B.—Final Examination, Part I.:* Hilda K. Ewens ; *2nd Examination, Part II.:* D. G. Cossham ; *1st Examination:* Hilda M. Brown, J. R. Duerden, A. J. Keivill, T. H. A. Pinniger, Marjorie S. Neville. *B.D.S., 1st Examination:* Doris B. Milton (in Zoology completing examination), G. N. O'Season. *Diploma in Dental Surgery—1st Examination:* J. L. Delicati, C. F. Long, W. H. Shipway. *Diploma in Public Health:* A. Semple, R. E. Thomas.

APPOINTMENTS.

Charles Ferrier Walters, F.R.C.S. Eng., L.R.C.P. Lond., has been appointed Honorary Surgeon to the Bristol Royal Infirmary.

Hubert Chitty, M.B., M.S. Lond., F.R.C.S. Eng., L.R.C.P. Lond., has been appointed Honorary Assistant Surgeon to the Bristol Royal Infirmary.

Capt. J. P. I. Harty has been appointed Specialist in Ear, Nose and Throat Affections at No. 6 General Hospital, Rouen.

Despatches.—The following local medical men have recently been mentioned in Despatches (October 15th):—Thurston, H. C., Col., R.A.M.C., C.M.G.; Green-Armytage, V. B., Capt., I.M.S.; Quinlan, W. T., Capt., R.A.M.C. (S.R.); Mumford, W. G., M.B., F.R.S., temporary Capt., R.A.M.C.; Costobadie, H. P., F.R.C.S., temporary Lieut., R.A.M.C.; Young, J., M.D., Lt.-Col., R.A.M.C.(T.), 3rd S.M.F.A.; Williamson, G. S., Capt., R.A.M.C.(T.), 3rd S.M.F.A.; Smythe, H. J. D., Capt., R.A.M.C.(T.), 3rd S.M.F.A.; Daukes, S. H., M.B., Capt., R.A.M.C.(T.), Lond. Sanit. Co.

Wookey, E. E., Lieut., 4th Glos. (T.F.).

* Denotes qualification.

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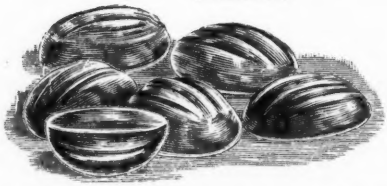

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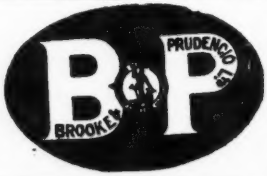

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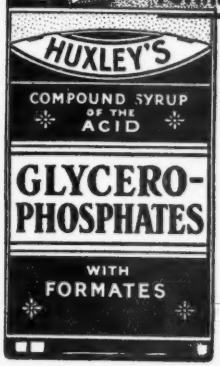

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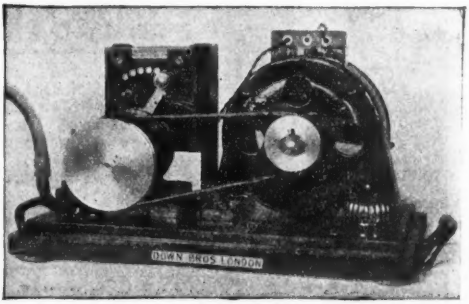

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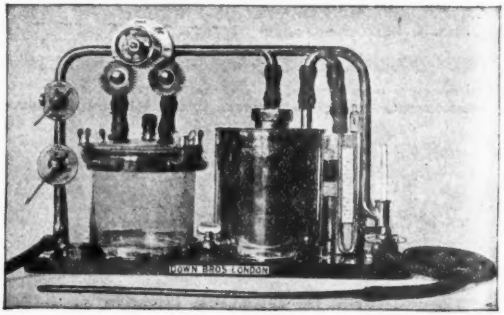

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